IOWA STATE UNIVERSITY
College of Agriculture and Life Sciences

STORIES

IN AGRICULTURE AND LIFE SCIENCES VOL.7 NO.2, 2013

BREAKTHROUGHS
125 YEARS
AND COUNTING

STORIES
IN AGRICULTURE AND LIFE SCIENCES

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Listen. Research. Educate. Repeat.


Photo: Bob Elbert

The cyclical nature of our land-grant institution became very apparent as I was editing stories for this issue. The Iowa Agriculture and Home Economics Experiment Station is the program that has allowed this research cycle to continue successfully for 125 years.

Advances in plant breeding developing crops to thrive in drought conditions, gaining insight to animal and human immune systems, refining traits in livestock to achieve healthier meat products and the stewardship of our environment using prairie strips near crop fields are all examples of research making breakthroughs today that carry on the legacy of excellence set by scientists of the past.

When I worked in the agronomy department, I would hear faculty talk about a "family tree" of research with branches reflecting those who served as major professors for a multitude of graduates. These conversations, like many involving genealogy, could go on for some time. They reminded me of two important truths —one, the impact of excellent teacher-researchers is life-changing for individuals and industries and two, everything we do is built upon the success of others.

That's evident in the stories that follow. As is the relevance of current research funded by the Experiment Station and performed by faculty on Experiment Station appointment. They are celebrating the accomplishments of researchers past by blazing new scientific trails of their own.

Kind regards,

Melea Reicks Licht

ON THE COVER

Patrick Schnable explains the map of the corn genome he and his colleagues developed. Schnable is the Iowa Corn Endowed Chair in Genetics and director of the Center for Plant Genomics at Iowa State. Their research, like others funded by the Agricultural and Home Economics Experiment Station, resulted in breakthroughs in how we understand growth and development of corn.

Photo: Jim Heemstra

Photo: McClanahan Studio

RENOVATED CURTISS HALL ENTERS NEW ERA

For more than a century, Curtiss Hall has stood as the core of the College of Agriculture and Life Sciences. This historic symbol and college home has recently been revitalized and redesigned to serve students in a world-class innovative learning facility. A dedication on Oct. 1 celebrated completion of the new spaces including the Neil and Darlene Harl Commons, a student-centered gathering space on the lower level including the Global Café; the Leonard and Evelyn Dolezal Auditorium and a new terrazzo floor in the central rotunda. For a video illustrating the transformation visit www.stories.cals.iastate.edu.

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125 BREAKTHROUGHS

Most people know me as the dean of an Iowa State college that has roots going back 155 years.

Some may know less about the other title I hold, linked to an agricultural research program that has served Iowa for 125 years.

I am director of the Iowa Agriculture and Home Economics Experiment Station. Sometimes it's abbreviated to just Experiment Station. It's 125 years old this year.

In 1888, Iowa approved the terms of the federal Hatch Act, establishing an experiment station at Iowa State. The Hatch Act offered federal aid for states to establish agricultural research stations linked to land-grant colleges. In every state, the act officiated a marriage of science and agriculture that promoted "scientific investigation and experiments respecting the principles and applications of agricultural science" and resulted in a progeny of scientific breakthroughs.

The Experiment Station is deeply woven into every aspect of how our college fulfills Iowa State's mission. It makes possible vital infrastructure—people, facilities and programs—to meet Iowans' needs and strengthen its most vital industry. It's education and mentorship of students by some of the world's leading agricultural scientists across many disciplines. It's science-based information reaching every corner of the state through extension and outreach.

Today, the Experiment Station supports faculty researchers and scientific staff in more than two dozen departments and centers in our college. Also, the Experiment Station supports faculty in the College of Human Sciences who are conducting research on topics such as food safety, childhood obesity and the health and well-being of rural elderly. And campus-wide, the Experiment Station helps faculty through its support for high-tech research instrumentation facilities and biotechnology programs.

In all those ways, the Experiment Station truly embodies "Science With Practice."

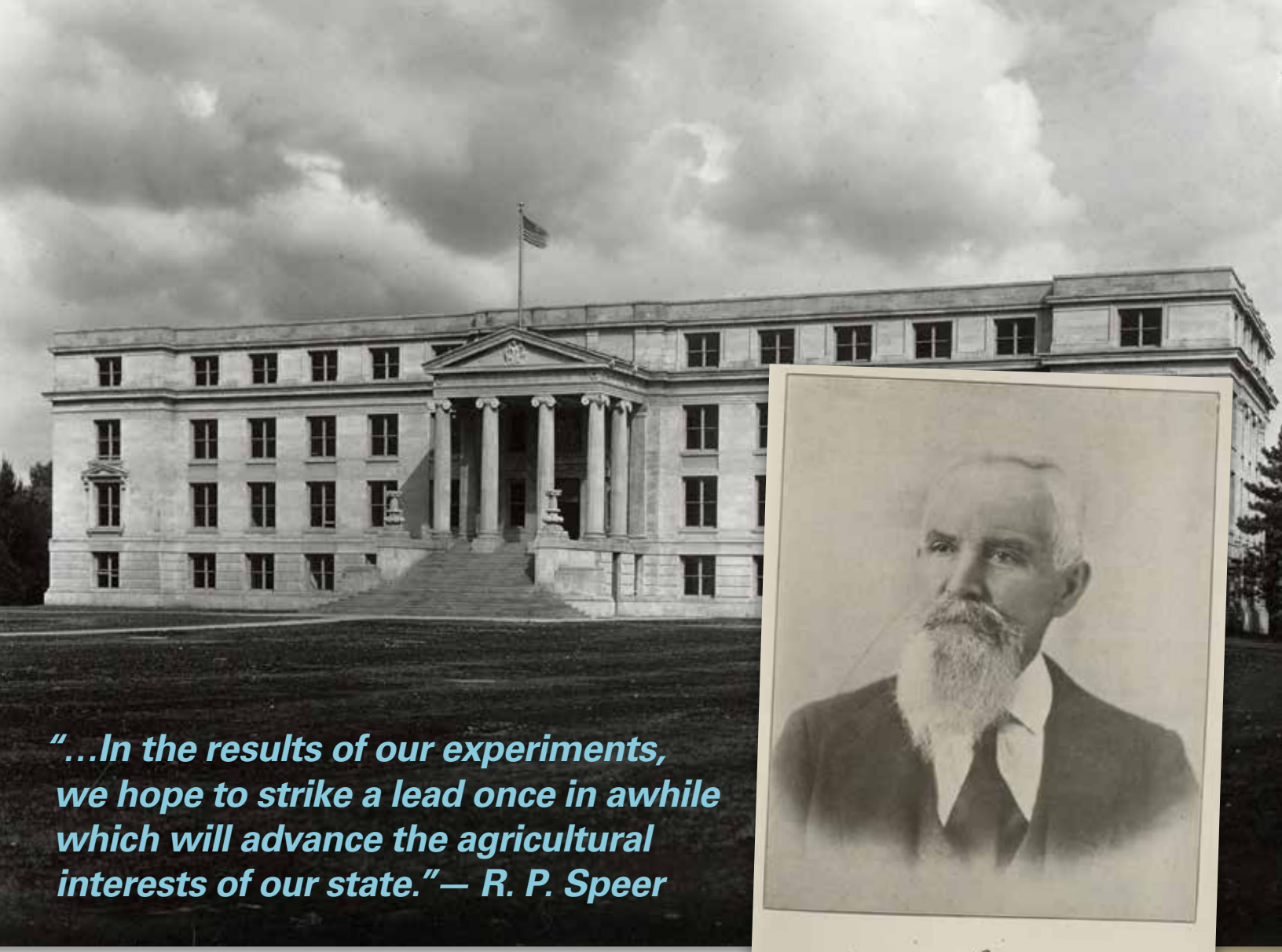
The Experiment Station sounds like a destination you could visit. Maybe that was true, back at the very beginning. The first Experiment Station director, R.P. Speer, led a small band of scientists (three, to be exact). To "visit" the Experiment Station today, you'd need to stop at many places on campus and around the state (including what I believe is the nation's finest system of research and demonstration farms at 12 locations), plus you'd have to meet many people, teams and partners. To get a true sense of the Experiment Station, think of it as a diverse portfolio of people, places and programs working for the good of Iowa and the betterment of agriculture.

Please check out the Online Extra for links to 125 highlights of past Experiment Station achievements, a video about its legacy of research and a snapshot of current research.

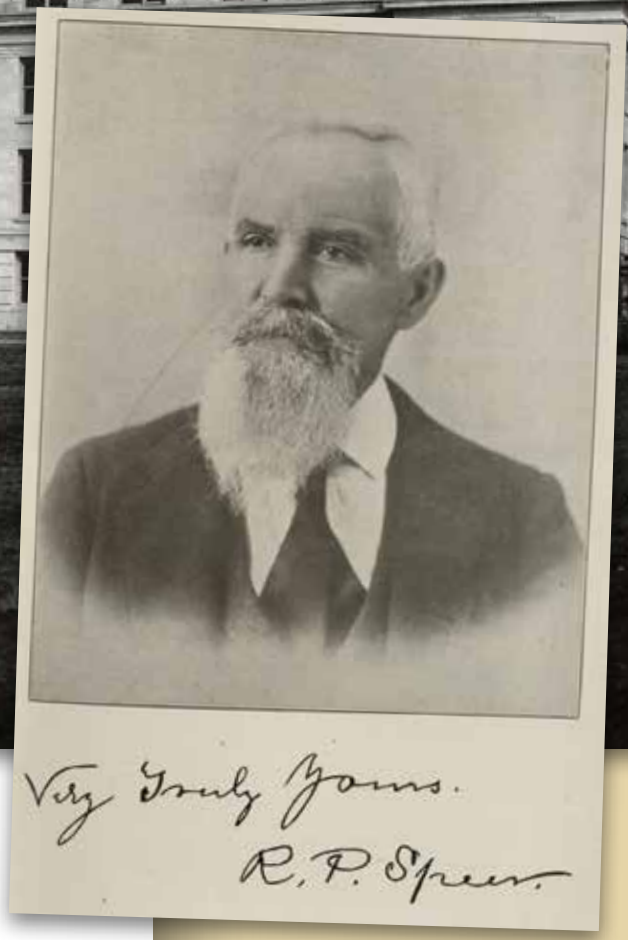
But if there's only four things you should know about the Experiment Station, or when you see the director title after my name, keep these in mind:

1. The Experiment Station is Iowa's only public agricultural research program. The Experiment Station is critical to meeting the needs of the incredibly complex, ever-shifting biological system that is agriculture. Currently nearly 750 active research projects are tied to faculty and staff supported by the Experiment Station—research on plants, animals, natural resources, food and nutrition, energy, economics and much more. These resources make possible the work of 294 faculty and 380 staff.

2. Public investment in the Experiment Station yields results. Studies by economists at Iowa State and Yale University found that the rate of return to society from publicly funded agricultural research is 50 percent and, in some newer studies, even higher—that's a 50 percent real rate of return annually. It's a reason why keeping Experiment Station funding reliable and growing keeps Iowa agriculture strong. That foundation is a springboard our scientists successfully leverage to win grants and contracts.



"…In the results of our experiments, we hope to strike a lead once in awhile which will advance the agricultural interests of our state."— R. P. Speer



Curtiss Hall, 1909

3. Experiment Station research is about today and tomorrow. The Experiment Station portfolio has breadth and depth—it's short-term applied research that meets immediate problems and opportunities and it's taking-the-long-view basic research that sets the table for future discoveries.

4. The Experiment Station supports economic development. A world-class Experiment Station, coupled with Iowa's powerhouse agricultural productivity, are critical assets for the state's economy. Increasingly, our economy depends on innovation, knowledge and technological advancement. Agricultural research supports those goals. In 2010, we tallied how many Iowa businesses, from entrepreneur to multinational, our scientists work with in a year's time and it was over 300.

Thomas Jefferson believed agriculture to be the first in utility and should be the first in respect, and that it is "a science of the very first order." That is still true today. Our Experiment Station represents science of the very first order making breakthroughs to strengthen a state of agriculture of the very first order.

Wendy Wintersteen
Endowed Dean of Agriculture
and Life Sciences

STORIES ONLINE www.stories.cals.iastate.edu

Watch a video on the history of the Agricultural Experiment Station, find 125 historical highlights of Experiment Station research and summaries of current projects online.

***Lyric Bartholomay** checks a trap for test subjects. Her efforts coordinating Iowa's mosquito and tick surveillance help ensure public heath and safety.*

HITTING ALL THE RIGHT NOTES, **PROTECTING PUBLIC HEALTH**

By Ed Adcock

IF YOUR NAME IS LYRIC, IT HELPS TO BE MUSICAL.

Lyric Bartholomay, an associate professor of entomology, returned to music and singing a few years ago. She performs with a pop group called Echo 18 that includes two other agriculture and life sciences faculty.

"My stage name is on my birth certificate," she says.

She turned to singing because of her work. While going through the process to obtain tenure, Bartholomay realized her identity was dominated by work. Not wanting to wait until retirement "to have some of those enriching outside pursuits in my life," she started voice lessons.

The creativity and passion that drives her performing and song-writing does the same for her research, teaching and outreach activities.

Bartholomay joined Iowa State in 2005 taking the place of Wayne Rowley, who was retiring. She "inherited" long-term mosquito and tick surveillance programs run by Rowley, and took on a molecular biology research program in a newly renovated lab. "It's worked out beautifully," she says.

She gets to teach—one of her great loves—do research she values and does outreach that is important to public health, including coordinating the state's mosquito and tick surveillance efforts.

Entomology became something of a calling for the Colorado native. She was studying zoology at Colorado State University and took an entomology class taught by a charismatic professor.

"This class just captivated me," Bartholomay says. She switched majors, but also was fascinated by microbiology and infectious diseases so medical entomology covered all her interests. Besides the bachelor's degree in bioagricultural sciences and pest management from Colorado State, she earned a doctorate in comparative biomedical sciences and entomology at the University of Wisconsin-Madison.

As an undergrad she read about new genetically modified strategies to make malaria mosquitoes resistant to malaria

Photos: Bob Elbert

Lyric Bartholomay performs with Echo 18, a group of friends that often includes a few other agriculture and life sciences faculty. Ken Moore, professor of agronomy, is at left. Her creativity also drives her entomology research, teaching and outreach activities.

Photo: Bob Elbert

parasites and other pathogens, and her studies took on an added dimension.

"I got into it for philanthropic reasons, too," she says. "Insect-borne diseases, like malaria, kill millions and make others so sick they can't function or contribute to society."

Genetics might also have played a part. Her father, Barry Beaty, is an accomplished professor at Colorado State, doing work in the same field—mosquito-borne diseases. Bartholomay even collaborates with him on a research project.

Together they are trying to find genes in the mosquito that are critical to its survival so the genes could be "turned off," calling the process "molecular mosquitocide." Funding for the project is from the National Institutes of Health.

"We certainly need ways to protect people chemically and by vaccines, but vector (insect) control is really important," she says.

Insecticides can be effective, but kill more than the mosquitoes. Another disadvantage is resistance. The mosquitocide approach would allow researchers to target mosquitoes and might make resistance a nonissue.

State and federal funds for mosquito surveillance in Iowa have dried up after the flurry surrounding the discovery of West Nile virus. "It's kind of a frustration because it's such an important public health service that we provide and we have to struggle to fund it. The deans have been awesome in CALS because they recognize how important it is and have helped me out with a lot of support."

Iowans who find ticks can send them into her office for identification and to see if it took any blood. The lab sends a note to tell them what tick they've been exposed to. Just one of three kinds of ticks in the state transmits Lyme disease, with most originating in northeast Iowa, although they are moving west.

There are about 150 cases a year of Lyme disease diagnosed in Iowa each year, she says, but the Centers for Disease Control believes the numbers are grossly underestimated.

An on-campus collaboration is taking her expertise in a new direction. Hank Harris, animal science professor, asked Bartholomay to speak to his medical microbiology class and discovered she was a "fantastic lecturer."

"I told her if she got tired of killing mosquitoes, that we could work on vaccines for 'mosquitoes in water,'" he says, referring to shrimp research at Harrisvaccines, the company he founded.

The shrimp-farming industry is looking for disease resistance and, like mosquitoes, they are arthropods, she says. "I think I've brought in some knowledge of physiology the shrimp industry was lacking."

Of all her varied activities, Bartholomay calls teaching and mentoring students "great fun." She enjoys hearing from them after they have gone on to graduate school and careers.

"I came into this thinking I would change the world with transgenic mosquitoes, but I hope I change the world by inspiring junior scientists to do great things."

Photo: Kristin Senty

*Economist **Ron Deiter** is known for helping students develop the skills necessary to successfully enter the work force through his efforts in the classroom and advising the Agricultural Business Club.*

AGRICULTURAL ECONOMICS PROFESSOR IN HIGH DEMAND

By Kristin Senty

Not currently involved in research, or extension and outreach activities, Ron Deiter is the first to admit he's "not your typical ag economics professor." Yet he plays a key role in developing Iowa State's most significant output—students.

With responsibilities in undergraduate teaching, advising and administration, Deiter's day-to-day mirrors what he learned as an undergrad: a teacher with a focus on the growth and development of students can affect their outcomes in some pretty significant ways.

That idea was shaped years ago when Deiter was an undergrad studying agricultural economics at the University of Wisconsin in Platteville just 10 miles from the small dairy operation his family farmed.

An internship with the Statistics Reporting Service interviewing farmers about yield estimates taught him about bridging gaps by making connections. "One potato farmer wouldn't cooperate with me," he says. "We were both Green Bay Packers fans so I developed a relationship with him around that. He finally agreed to participate in the survey."

As the Wisconsin FFA president his freshman year in college, Deiter spent considerable time traveling the state and giving talks to high school students about the importance of developing leadership skills. He knew he liked working with students, and realized he could relate to them as a mentor.

He was especially influenced by the example set by his professors. "They showed me they were prepared, organized and personable. I admired these things in my teachers and wanted to emulate them," he says. "It seemed like a natural calling for me to help others learn."

Deiter went on to graduate school at the University of Illinois, earning a doctorate in 1979 in agricultural economics. He came to Iowa State the same year, shifting his focus by the mid-1980s from research and teaching to a sole teaching and advising appointment. Says Deiter, "I felt I would have more of an impact on people's lives by teaching and advising—to impact a person is very important."

He enjoys teaching microeconomics, agricultural sales and sports economics, a class he developed in recent years which incorporates his love of sports. He continues

to write articles on teaching pedagogy, and in 2001 won the EB Knight Outstanding Journal Article Award from the National Association of Colleges and Teachers of Agriculture for an article on the use of humor as a teaching tool in the classroom.

Deiter devotes a great deal of time and attention to serving as Ag Business Club co-adviser. The club has earned a reputation as one of the top in the nation—an achievement he's "most proud of." While the club has won numerous awards, including a seven-year run as outstanding club by the Agricultural and Applied Economic Association, its impact on individual students is what Deiter emphasizes.

Over the years he's received notes and emails from parents sharing their appreciation for the positive impact involvement in the club had on their daughter or son and many alumni keep in touch with him.

Alumnus Kaci Demott ('12 agricultural business and international agriculture) is a former club officer who now works for Consolidated Grain and Barge out of Louisville, Ky., as an ag loan underwriter. She credits the club and Deiter with developing the skills she needed to effectively enter her career, and says "they're the reasons why I came to Iowa State."

"From his own personal experience, Professor Deiter really understands what it's like for students who grew up in the industry. He's passionate about the club and student needs," she says. "Now that I work in the industry I can see how many people know and respect him. The role he plays is more than just a career—it's what he really enjoys."

"A teacher or an adviser can gain a lot of self-satisfaction knowing we've helped others get to where they want to go in life," he says. "My work is very rewarding. It's been a good ride that I'd do over in an instant." S

BRUENE CAREER SERVICES SUITE DEDICATED AUG. 31

The renovated office suite of the College of Agriculture and Life Sciences Career Services was dedicated Aug. 31 in honor **Roger Bruene** ('56 agronomy), the former director. A group of alumni, including **Roger Underwood** ('80 agricultural business), led a fundraising initiative to raise funds to name the offices on the ground floor of Curtiss Hall. Bruene is pictured with Underwood and Dean Wendy Wintersteen at the dedication. The hour-long ceremony is available to view on YouTube – visit www.stories.cals.iastate.edu for a link.

NEW IOWA NUTRIENT REDUCTION STRATEGY RELEASED

The Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources and Iowa State University recently released the updated Iowa Nutrient Reduction Strategy. The Iowa Nutrient Reduction Strategy is a science and technology-based approach to assess and reduce nutrients delivered to Iowa waterways and the Gulf of Mexico. The strategy is designed to direct efforts to reduce nutrients in surface water from both point sources, such as wastewater treatment plants and industrial facilities, and nonpoint sources, including farm fields and urban areas, in a scientific, reasonable and cost effective manner. Visit www.stories.cals.iastate.edu for a link to the strategy.

IOWA STATE UPDATES METHOD FOR RATING SOIL PRODUCTIVITY

Advances in soil science necessitated an update in the Corn Suitability Rating (CSR), a system for rating the crop-growing productivity of Iowa soil. Originally established in 1971, the CSR was created in response to county assessors who needed a measure to help assess the productivity of farmland. Today, the CSR is used in many additional ways, including developing land use plans, determining land values, predicting yields and negotiating cash rents. Visit www.stories.cals.iastate.edu for a link to the updated system.

CALS STUDENTS BRING IT HOME INAUGURAL BACON EXPO

- **1,250** pounds of cooked bacon
- **1,076** attendees
- **248** days of preparation
- **100** pounds of bacon donated to a local food pantry
- **60** student organizers
- **16** student organizations participated
- **9** vendors: 3 restaurants and 6 companies or organizations
- **3** title sponsors: Iowa Select Farms, Elanco, College of Agriculture and Life Sciences
- **1** motto: Life, liberty and the pursuit of bacon

For photos and video from the Oct. 19 expo visit **www.stories.cals.iastate.edu.**

Photo: Bob Elbert

***Cheryl Morris**, assistant professor of comparative animal nutrition, trains and handles dogs in agility competitions. Her rescue dog Karma won big at last year's American Kennel Club's National Agility Championships.*

BEST OF SHOW

KINDRED SPIRITS SHARE ZEAL FOR WORK AND PLAY

By Lynn Laws

It has been said dogs resemble their owners, at times both in appearance and personality.

Meet Cheryl Morris and her six-year-old Border collie, Karma, which she adopted as a puppy from a shelter, after it was rescued from a Walmart parking lot.

"Border collies have a superior intellect, combined with an intensity and obsessive zeal for working," according to Michele Welton, dog trainer and breed expert. "They are sharp-eyed, quick-thinking and bred for endless miles of sprinting and stop-and-go action."

"That description fits Karma perfectly," says Morris. And she admits her husband would fondly attest that it fits her as well. "My husband would crack up at that description. He tells me frequently I'm obsessive about what I do and I have to do everything full out."

In addition to working out at the local gym, Morris owns and exercises six dogs. "This time of year is heavy training. Each dog is trained three to five times a week. My training sessions are typically very short, anywhere from 10 to 20 minutes per dog. They are run together around the property playing ball for at least 30 minutes each morning and again in each evening in addition to their training."

Regarding work, Morris says, "I'm technically on a nine-month appointment at Iowa State, but when you are developing new courses it takes more than 40 hours per week. My Omaha zoo appointment is equivalent to quarter-time. However, animals don't fit their diets into just summer months. So it ends up being about 20 hours per month on average."

Whether in training or in competitions, Morris mirrors Karma's energy, fitness and zeal for agility. Their partnership led to a big win at the American Kennel Club's (AKC) National Agility Championships held in Tulsa, Okla., in March. There Morris and Karma beat out professional handlers, including AKC World team members, to take the championship in Karma's height category. Morris was "over the moon."

"To go out and compete against that level, with a dog that was found in a Walmart parking lot and ended up in a shelter—it was amazing. I cried all the way home from Tulsa."

Karma and Morris competed in all four tournaments at the United States Dog Agility Association Cynosport World Games in October. They brought home a second place finish in the Snooker event, which Morriss describes as "a strategy game similar to a brain teaser at a high rate of speed."

"Karma is just a quirky little dog. She's so typical Border collie. She's fun and she makes me laugh. She's just a really lovable dog, but it takes her a long time to warm up to people—kind of like I do," says Morris. S

FOOD AS FUEL FOR FOUR LEGGED FRIENDS

Cheryl Morris, assistant professor of comparative animal nutrition in the animal science department at Iowa State, specializes in carnivore nutrition, particularly raw diet formulations for domestic and exotic carnivores. Here are her tips for keeping your dog or cat healthy through diet:

- **Variety:** When we provide them variety they were designed to have, beneficial bacterial that live in their gastrointestinal tract flourish and it strengthens their immunity to disease.
- **Water:** Dogs and cats are carnivorous. Cats especially have a low thirst drive and may not drink enough water from a water dish. Dry food, or kibble, is only about 10 percent water. Providing a diet higher in water content, or adding water to kibble, can be beneficial.

ONLINE EXTRA www.stories.cals.iastate.edu

See more photos of Karma in action online.

FINDING ROOTS AND WINGS WHILE MAKING A DIFFERENCE AROUND THE WORLD

By Barbara McBreen

Sleeping at the base of a 2,000-year-old Redwood inspired Sean Lundy to seek a career in international development. Opportunities at Iowa State University are helping his dream grow.

The summer after graduating from high school, Lundy, a senior in global resource systems and nutrition, worked for the Student Conservation Association as part of a six-member crew in Redwood National Park. Students participating in the program are sent to national parks to restore trails, indigenous flora and cultural landmarks to better understand environmental conservation. For five weeks, Lundy camped in the Redwoods and hiked five miles to work carrying up to 60 pounds of gear.

"I had a lot of alone time out there to think, and I walked away knowing I wanted to do something in college that would make a difference in this world," Lundy says.

That's what brought him to Iowa State University.

The trail he's since blazed led him to Uganda twice, Panama and Washington D.C. Each internship, he says, has contributed to understanding the politics, cultural influences and funding mechanisms that affect international development.

Lundy's international experiences were fueled by scholarships. The Manatt Scholarship, Crawford Student Support Fund and "Peacemaking Award" from his home church made it possible for him to go abroad.

Tailoring International Development

In 2010, he was selected for the Uganda Service Learning Program sponsored by the College of Agriculture and Life Sciences in collaboration with the Center for Sustainable Rural Livelihoods (CSRL). He remembers his advisers emphasizing six-weeks seemed like a long time to students, but the key to successful development work is long-term sustainability.

"Our program is approaching international development in the correct way," Lundy says. "We aren't taking a blanket approach to a whole country. There are cultural differences in each region. We are tailoring our efforts to meet the needs of the Kamuli District."

Lundy went back to Uganda the next summer to work with a non-governmental organization called Volunteer Efforts for Development Concerns (VEDCO). He and Brian Castro, also a senior in global resource systems, spent the first few weeks collecting basic health data on children in the Kumali district who were participants in a school feeding program. The two then chose 20 families to conduct more in-depth nutritional and socio-economic case studies.

"We went to their homes and we got to know the children really well," Lundy says. "We wanted to understand how these children lived their lives. We walked to school with them, ate the food they ate and got to know their families."

In the Kumali district, Lundy says families as large as eight live in homes with earthen walls the size of the living room in his college apartment. Most are subsistence farmers relying on plots less than an acre.

Contributed Photo.

*A young fan in Panama walks with **Sean Lundy**, a senior in global resource systems. Lundy worked in Panama analyzing the use of goat milk to alleviate childhood malnutrition.*

Lundy says their data indicated improvements in the nutritional status of children as a result of the school feeding program.

"The servings of extra bean porridge at the school, which is ultimately what we assessed, was extremely effective when we compared the data from 2010 to 2011," Lundy says. "Good nutrition affects cognitive ability, physical growth and it helps children to be more successful."

Communication Key to Sustainability

During the summer of 2012, Lundy planned to continue work on child nutrition in Haiti. Those plans had to change because of the 2010 earthquake. Iowa State would not permit students to travel to Haiti because the U.S. State Department issued travel warnings. Lundy quickly made other plans.

David Acker, College of Agriculture and Life Sciences dean of academic and global programs, contacted Jose Pacheco ('92 ag studies), a senior Panamaniam official, to help Lundy and Castro develop an internship with the Panamanian Ministry of Agriculture Development (MIDA) and UNICEF. The framework for the internship was modeled after their research in Uganda.

"We didn't know what was going to happen when we landed in Panama City, but it was a phenomenal experience," Lundy says. "The MIDA advisers did everything they could to show us what was going on in Panama and enabled us to be effective in the field."

In Panama they focused on assessing the nutritional impact of a dairy goat project on children in eleven nutritionally deficient communities. The project's purpose was to improve child under-nutrition through supplemental dietary goat milk.

Lundy says the goats were supposed to be sent to West Africa, but that project fell through. As a result, the Panamanian government received the goats from the United Nations and implemented a program addressing nutritional issues in remote rural areas of Panama.

"MIDA did a good job developing the project, but goats are not indigenous to Panama, so most of the farmers had no idea how to integrate goats into their agriculture practices," Lundy says.

The results of the project highlighted common issues within sustainable development Lundy says. The need for good communication with communities is essential. Lundy and Castro provided recommendations to MIDA and UNICEF officials, who welcomed the feedback and changed the program on a national scale.

"I left Uganda two years earlier thinking I had not made as big of a difference as I had hoped. That was frustrating, but it motivated me to find other experiences that would help me build on that first trip. I think we made a tangible and quantifiable impact in those Panamanian communities," Lundy says.

Photo: Barb McBreen

A copy of Senate Bill 945, better known as the Farm Bill, was a gift to Sean Lundy, a senior in global resource systems. He received it last summer after finishing an internship with the Unites States Senate Committee on Agriculture, Nutrition and Forestry.

Focusing on Policy at Home

During the summer of 2013 Lundy served as an intern for the Unites States Senate Committee on Agriculture, Nutrition and Forestry. This provided an opportunity for him to be involved in the Farm Bill legislative process.

"It's cool to see where all the decisions are made and observe the central nervous system of our federal government," Lundy says. "The agriculture committee worked well together. I know agricultural policy is in good hands."

Working in Washington D.C. offered him valuable insight to the role politics plays in international development.

The internship also presented several networking opportunities, such as lunch with Senator Debbie Stabenow, Chairwoman of the U.S. Senate Committee on Agriculture, Nutrition and Forestry. Tina May, professional senior staff for the Senate committee, says Lundy was articulate and understood international development.

"Senate Agriculture Committee interns are a critical part of the team. It isn't easy to get one of these internships, especially not in the middle of passing a five-year Farm Bill," May says. "Sean's application and subsequent work on the Committee exemplified all of the qualities we expect of our interns. We were continually impressed with his work and expect to see Sean doing great things in the future."

A Life Worth Watching

Lundy lives by advice given to him a while ago, "One day your life will flash before your eyes—do something worth watching."

To that end, Lundy has served as president of MEDLIFE (Medicine, Education and Development for Low-Income Families Everywhere), an organization that coordinates mobile health clinics in Latin America. He is also vice president of the Global Health and AIDS Coalition, which he co-founded. The coalition advocates increased access to medication and healthcare. It also promotes awareness about the resource constraints and disparities in global health.

Lundy wasn't sure what he wanted to do when he came to Iowa State, but majoring in global resource systems and getting involved in clubs allowed him to make a difference at home and abroad.

He recently was accepted to serve in the Peace Corps after graduation in May 2014 and plans on attending graduate school. He's looking forward to learning more and finding new ways to make a difference. S

Contributed Photo

Two summer internships in Uganda helped Sean Lundy, a senior in global resource systems, understand the importance of working with youth in achieving sustainable international development.

This year's class of George Washington Carver interns was the second largest class since the program started in 1997. Meet the interns online at www.stories.cals.iastate.edu.

SHARING THE GEORGE WASHINGTON CARVER EXPERIENCE

By Barbara McBreen

This summer Celize Christy helped students from across the United States follow in the footsteps of George Washington Carver as they explored agricultural science in research labs at Iowa State University.

For eight weeks Christy, a native of Dallas, worked with Theressa Cooper, College of Agriculture and Life Sciences assistant dean for diversity, to coordinate the program.

"I was asked to assist with the program and it fit with what I wanted to do," Christy says. "It was fun to watch these young adults learn together and connect as friends."

Christy says she was looking for a professional position for the summer and Dean Wendy Wintersteen helped connect Christy with Cooper.

"She is so personable and offered valuable guidance," Christy says of Cooper. "She shared her experiences and helped me move ahead and grow."

As the coordinator for the George Washington Carver Internship Program, Christy, a junior in animal science, helped manage 13 high school and 22 college students. The program, which is sponsored by the College of Agriculture and Life Sciences, introduces students to various areas of research. Seven of the students are part of the Science Bound program at Iowa State that recently received a grant from DuPont Pioneer.

Cooper says Christy was a valuable asset this summer.

"She was engaging, pleasant and humorous, which helped the interns feel like they were part of the Iowa State community," Cooper says.

Careers in science, technology, engineering and mathematics (STEM) will increase 17 percent through 2018 according to the U.S. Department of Commerce. Cooper says the internship program bridges the gap between access and opportunity for multicultural populations.

The 2013 summer class was the second largest class of interns since the program started in 1997. The students were mainly from Iowa, but also included students from Puerto Rico, Texas, Illinois and Alabama. Since the start of the program faculty have mentored more than 300 interns.

From getting nightly updates about their daily experiences to hosting students at a barbecue, Christy says coordinating the program was an eye-opening experience.

"Some of the students were in programs they hadn't thought about exploring and it opened their eyes," Christy says. "Three students had just graduated and decided to go to Iowa

Photo: Barbara McBreen

***Celize Christy**, a junior in animal science, helped students in the George Washington Carver Internship program feel at home while at Iowa State University including at this research poster presentation.*

Photo: Barbara McBreen

State to pursue their master's degree because of this experience."

For Ellen Tisdale the internship provided more than a summer experience. Tisdale, who is now a graduate student with a research assistantship in genetics, says she was introduced to a caring community that encouraged her to pursue a graduate degree.

"When I got to Iowa State, I met some extremely wonderful and helpful people," the interns in any way possible and often went out of her way to make sure we were ok."

While she was introducing interns to campus, Christy says she also was learning more about the college.

"I met several professors and mentors and I learned from them about how they successfully pursued their careers," Christy says.

Next summer Christy plans to study abroad and has applied for the college's Service Learning Program in Uganda. She has been accepted into the Agricultural and Life Sciences student ambassador program. She hopes to work in international rural development after she graduates. S

CELEBRATING 150 YEARS **OF GEORGE WASHINGTON CARVER'S LEGACY**

Although the exact year and date of George Washington Carver's birth is unknown, most historians believe he was most likely born in 1864. That's 150 years worth celebrating.

In 2014, the College of Agriculture and Life Sciences will honor Carver for his many scientific discoveries, achievements and his contributions to the social justice and civil rights movements. "Celebrating the Life and Legacy of George Washington Carver" events during the year will include a lecture series, seminars, student research opportunities, food tastings, displays and artistic performances.

Carver was the first African American to enroll at Iowa State in 1891. He received his bachelor's degree in 1894, his master's in 1896 and then became the first African American faculty member at Iowa State. As one of our most distinguished alumni, Carver went on to become a brilliant scientist and educator at the Tuskegee Institute, helping farmers with ideas he worked on when he was a student and faculty member at Iowa State. His research changed how we look at crops. His life and teaching continue to inspire millions.

For more details about the Celebrating the Life and Legacy of George Washington Carver visit **www.stories.cals.iastate.edu.**

***Patrick Schnable** is a Charles F. Curtiss Distinguished Professor of Agriculture and Life Sciences, a professor of agronomy and the Iowa Corn Promotion Board Endowed Chair in Genetics.*

Photo: Bob Elbert

VOICES

By Patrick Schnable

THE FUTURE OF AGRICULTURAL RESEARCH: COLLABORATION IN A RISING TIDE OF DATA

Growing world population and rising standards of living are increasing global demand for the products of agriculture.

To enable scientists to more readily identify and ultimately harness genes that contribute to agricultural productivity, the genetic blueprints of many crop and livestock species have been deciphered over the past decade. Iowa State faculty members have contributed to several of these high-profile genome sequencing projects.

Genetic Blueprint

An organism's genetic blueprint—its genotype—is not, however, sufficient to fully explain its growth and development—its phenotype. Instead, an organism's genotype interacts with its environment to define its phenotype, such as its yield or growth rate. Understanding how particular genotypes result in specific phenotypes under specific environments is a core goal of modern biological research.

Ultimately this understanding will allow agricultural scientists to predict the phenotype of a given genotype in a given environment. For example, we seek to predict the performance of a given corn hybrid in a specific field under a specific set of agronomic practices. The ability to make accurate predictions of this type will enable farmers to select the optimal hybrids for a given field in a given year.

Similarly, and analogous to "personalized medicine," such predictions will allow farmers to provide the optimal management strategy for livestock with defined genotypes. In addition, these predictions will facilitate the more efficient breeding of crops and livestock with commercially useful characteristics.

The prediction of phenotypes from genotype and environment is complicated by the fact that different genotypes respond to different environments in different ways. Hence, it is necessary to understand not only the roles of genotype and environment on phenotype, but also the influences of interactions between genotype and environment on phenotype. To parse these complex interactions and develop sufficient biological understanding to develop predictive models for use by breeders, agronomists and animal scientists, it will be necessary to obtain phenotypic data from many genotypes in many, well-characterized environments.

Advances in DNA sequencing technology, driven by the human genome project, are enabling scientists to readily characterize the genetic variation of hundreds to thousands of individuals in agricultural species. More challenging is doing the same for environments and phenotypes.

New tech to tackle Big Data

Iowa State University agricultural researchers in partnership with engineers are developing novel, sophisticated sensors to measure large numbers of diverse environments and phenotypes at high throughput in real time. This initiative will generate massive amounts of data that will dwarf the data deluge generated by genome sequencing projects and will therefore require a new approach to data.

The buzzword "Big Data" encompasses the acquisition, management, analysis and interpretation of information with extreme volume, variety, velocity (rate of acquisition), veracity, variability and complexity. The Big Data paradigm enables researchers to more quickly formulate and test novel hypotheses. Iowa State scientists are using the approaches of Big Data to develop statistical models that enable the prediction of phenotypes based on genotypes and environmental data.

Iowa State breeders and geneticists together with computational scientists are making use of Big Data to better understand and model crop and livestock growth and development.

The results of these collaborations promise to be both exciting and wide-reaching. They will advance our understanding of biological processes. They will revolutionize our ability to create crops and livestock that exhibit enhanced resilience to variable weather patterns associated with global climate change, helping to ensure a plentiful and stable supply of food and feed. And, importantly for Iowa, they offer substantial new opportunities for Iowa State to contribute to economic development.

Christian Petersen
(Danish-American, 1885-1961)
Cornhusker, Cast in 2001 from 1941 original plaster sculpture. Commissioned by University Museums. Iowa Art in State Buildings Project for the Roy J. Carver Co-Laboratory. In the Art on Campus Collection, University Museums, Iowa State University.

Photo: Bob Elbert

By Brian Meyer

UNCOVERING USEFUL TRUTHS, DIGGING DEEPER WITH STATISTICS

***Dan Nettleton**, the Laurence H. Baker Endowed Chair in Biological Statistics and professor of statistics, and colleagues help scientists achieve research goals using bigger data sets than ever before.*

The truth is out there, like fish waiting to be seined from a rising sea of scientific data. A key person casting the net is a statistician.

Not long ago, tracking one gene at a time was progress. Now scientists' ability to collect and measure genetic data in agriculture has exploded. Data from tens of thousands of genes flow in simultaneously. Cutting-edge technologies allow scientists to peer under the hood of plants, animals and other organisms to understand what's going on biologically and how genes function under different scenarios.

"Now the question is: How do we extract meaningful insights from these enormous datasets?" says Dan Nettleton, the Laurence H. Baker Endowed Chair in Biological Statistics and professor of statistics.

Nettleton, who collaborates with many teams of Iowa State agricultural scientists, says statisticians help to get at the truth by quantifying uncertainty. "Statisticians help to determine which explanations of the underlying reality are the most plausible based on the observed data. We work to help answer—as clearly as the data allow—the questions scientists pose."

In his own research, Nettleton develops new, innovative ways to analyze data to help scientists draw better conclusions. Statistical methodology helps pan for gold in the sea of data, sorting out differences that are truly meaningful from those that are just due to chance variation. But all that glitters is not gold. Some data may appear pan-worthy, but may not necessarily be repeatable or scientifically meaningful.

"When you're testing thousands of hypotheses, we need to make decisions on what results are truly worth our interest," Nettleton says. "We want to control the proportion of results that are just artifacts of the fact you have loads of data."

Statisticians—from the design of experiments to the analysis of data—help scientists get closer to useful truths, he says. "With all this data, we hope to make progress more quickly in developing soybeans that are more resistant to pathogens, corn that holds up better in drought or pigs that more efficiently use the feed they're given."

Historically, Iowa State has been a national leader in making statistics integral to agricultural research. In 1933, the Statistical Laboratory was the first of its kind. In 1935, the Experiment Station formed a statistical section, led by pioneer George Snedecor, to strengthen the marriage of statistics and agricultural research. The Experiment Station has supported statistics ever since.

Nettleton tries to quantify the uncertainty of future research. "Statistics must play a core role in the 'Big Data' era to develop new ways to analyze huge datasets. It's not just about finding one needle in a haystack. We hope many needles are waiting to be discovered." S

William Barnes and Tom Rosborough (American, b. 1958), (American, b. 1951) *Inferences Drawn*, 2009, Oil on canvas, Commissioned by University Museums. Iowa Art in State Buildings Project for Snedecor Hall. In the Art on Campus Collection, University Museums, Iowa State University.

UNLOCKING NEW POSSIBILITIES FOR PLANTS IN EACH NEW GENERATION

By Susan Thompson

Agronomy researchers are using the latest in genomic technology to usher in a new era of plant breeding in a department known for making revolutionary breakthroughs for more than 90 years.

Jianming Yu, associate professor and corn breeding specialist, and Asheesh "Danny" Singh, an assistant professor and soybean breeding expert, joined the agronomy department in 2013.

Kendall Lamkey, agronomy department chair, said the addition of Yu and Singh extends a long tradition of excellence in plant breeding.

"Dr. Yu is one of the top quantitative geneticists in the world and we look forward to the contributions he will continue to make to public and private plant breeding programs," he says. "Dr. Singh is an outstanding plant breeder who will expand our soybean research capabilities, as well as support the preparation of students for successful careers in agriculture."

DuPont Pioneer provided the funding for Yu's position as the Pioneer Distinguished Chair in Maize Breeding.

Yu, who arrived on campus in January, previously worked at Kansas State, studying plant-breeding methods, quantitative genetics and genomics. He earned a bachelor's degree in agronomy at Northwestern Agricultural University in China, a master's in plant breeding and genetics from Kansas State, and a doctorate in plant breeding and genetics from the University of Minnesota.

The job description for the position Yu now holds guides his work—"to combine maize breeding with cutting-edge genomic technologies to address significant questions in quantitative genetics, and to develop and improve contemporary breeding methods."

"To some, this may sound intangible. But to me, it means my team needs to conduct research with great impact, we need to address questions with significance, and our work needs to be original," he says.

"We saw in 2013 what a cold, rainy spring can do to corn plants, and how much damage a dry, hot summer can have on corn production," Yu says. "New discoveries will address these types of issues."

Yu's teaching duties include courses in plant breeding and genetics. The endowed Pioneer Distinguished Chair in Maize Breeding fund makes it possible for him to host special seminar events, where graduate students can meet with the guest speakers, introduce their own research and ask research and career development questions of experts.

Singh, a Canadian plant breeder, began work in April as the new Monsanto Chair in Soybean Breeding at Iowa State. Previously a research scientist and wheat breeder at the Semiarid Prairie Agricultural Research Centre of Agriculture and Agri-Food Canada, Singh says Iowa State is a world-leading university at the forefront of agriculture research and plant breeding.

"Soybean breeding at Iowa State is well known," he says. "Soybean is an extremely important crop to Iowa's production systems, and the uniqueness of the plant and its multiple uses drew me to soybean breeding."

Singh earned a bachelor's degree in agriculture and animal husbandry from G.B. Pant University of Agriculture and Technology in India, a master's in plant breeding and genetics from the University of Saskatchewan, and a doctorate in plant breeding and genetics from the University of Guelph.

Iowa State plant breeding research, with long-standing support of Iowa's soybean growers, already has led to the development of soybeans with improved yield, disease and insect resistance. Singh plans to build on that progress.

"Our team is working on developing superior packages for farmers for increased productivity and better weed and pest management, as well as improved health profile in our cultivars," he says.

Singh has two goals—farmers and industry making money from his team's inventions and training students to become the next generation of plant breeders in private and public institutions.

***Jianming Yu** (left), Pioneer Distinguished Chair in Maize Breeding, and **Asheesh "Danny" Singh**, Monsanto Chair in Soybean Breeding, joined the faculty at Iowa State University in 2013. Together with Iowa Corn Promotion Board Endowed Chair in Genetics Patrick Schnable, they are extending a long tradition of excellence in plant breeding.*

Photo: Bob Elbert

In September, Iowa State University announced an investment from the Iowa Corn Promotion Board to establish the Iowa Corn Promotion Board Endowed Chair in Genetics. Patrick Schnable, a Charles F. Curtiss Distinguished Professor in Agriculture and Life Sciences, a professor of agronomy and director of Iowa State's Center for Plant Genomics is the first to hold the chair.

"Big picture, Iowa Corn is launching an industry-wide initiative to develop functional genomic information," says Bob Bowman, a farmer from DeWitt and president of the Iowa Corn Promotion Board. "We are investing additional funds with Dr. Schnable and researchers at other universities to develop a new public-private collaboration to accomplish this goal. This $2 million investment in both the endowment and functional genomics demonstrates our commitment to this important area of research for Iowa farmers."

Bowman added, "Iowa Corn has a proud history of working with Dr. Pat Schnable, Iowa State and a coalition of other partners to produce the first sequence of the corn genome."

Schnable, who has been an Iowa State faculty member since 1988, has led wide-ranging research investigations of the corn genome and has developed a significant number of important genomic tools and resources.

Schnable is a fellow of the American Association for the Advancement of Science, serves as an associate editor for the PLoS Genetics journal and is chair of the American Society of Plant Biology's Science Policy Committee. He is a ChangJiang Scholar Professor at China Agriculture University in Beijing. Schnable received his bachelor's degree from Cornell University and earned his doctorate in plant breeding and genetics from Iowa State. Prior to joining the ISU faculty, Schnable conducted research at the Max Planck Institute for Plant Breeding in Germany.

Read Schnable's thoughts on the role of "Big Data" in plant genomics in "Voices" on page 14.

B73: BREAKTHROUGH OF THE PAST NOW PARENT TO HYBRID CORN WORLDWIDE

There was a push in the early part of the 20th Century to grow more corn for livestock feed. The number of corn acres increased, but the open-pollinated varieties grown at the time were low yielding.

A national effort to increase corn yields began in 1922 when state Agriculture Experiment Stations and the U.S. Department of Agriculture joined forces. That's when Iowa State University's breeding program began.

A team of USDA and ISU scientists developed the B73 line of hybrid corn in the 1970s and 1980s. It remains the basis for nearly all the seed-parent lines of corn used in the United States and throughout the temperate areas of the world.

Another major product of the breeding program was the free release of more than 30 inbred lines from the USDA-Iowa State breeding program.

INNOVATIVE RESEARCH RESULTS IN SWEET SUCCESS FOR PRODUCERS AND CONSUMERS

By Melea Reicks Licht

INNOVATIVE APPROACHES TO FOOD DEVELOPMENT, PROCESSING AND PRODUCTION AT IOWA STATE UNIVERSITY HAVE A TRACK RECORD OF SETTING NEW INDUSTRY STANDARDS AND HAVING FAR-REACHING, LONG-TERM IMPACTS.

Photo: Bob Elbert

***Mark Gleason** and colleagues cut to the core managing costly apple diseases, improving profitability and consumer safety and confidence.*

ORCHARD ADVANCEMENTS

Advances in integrated pest management developed at Iowa State stand to improve profitability for apple growers, food safety for consumers and potentially transform how diseases are managed industry-wide.

Mark Gleason, professor of plant pathology, and his colleagues are working to refine methods of spraying fungicides that fight major fungal diseases including sooty blotch and flyspeck and fruit rots. Their methods use weather and plant biology to pick the best time for application, rather than predetermined dates independent of orchard conditions. The new methods reduce input costs as well as the amount of residue present on the fruit at harvest, which improves safety and consumer confidence.

"If left untreated the black spots caused by sooty blotch and flyspeck make fresh market sale impossible. The fruit is then only fit for the cider market—a loss of 90% of value," Gleason says. " And, growers could save $75/acre if three sprays per season are eliminated. Best of all, growers value saving time, since they don't have to apply so many sprays late at night when wind speeds are low."

The researchers also are working to activate a regional warning system that will keep producers informed and ready to take action against the costly diseases.

RHAPSODY **IN BLUE (CHEESE)**

Fred and Robert Maytag approached Experiment Station dairy microbiologists Clarence Lane and Bernard Hammer with a food challenge in 1937 that would transform cheesemaking.

Together they created the first American blue cheese using cow's milk from the Maytag Dairy Farm, rather than the traditional sheep's milk. The process is now known for producing the world's finest blue cheese.

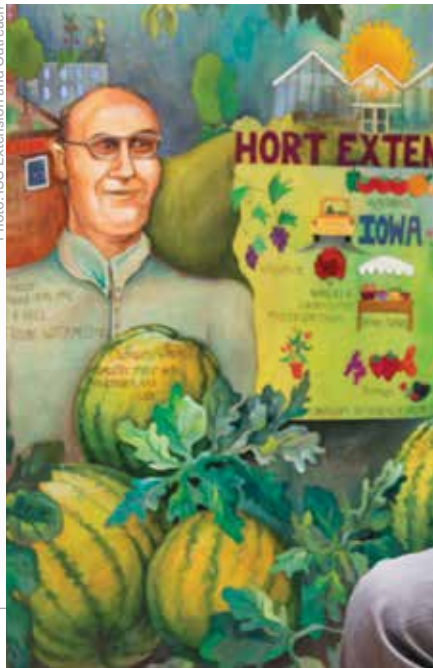


Photo: ISU Extension and Outreach

HOW **SWEET IT IS**

Charlie Hall didn't expect his seedless watermelon varieties would transform an entire industry. But, that's exactly what happened.

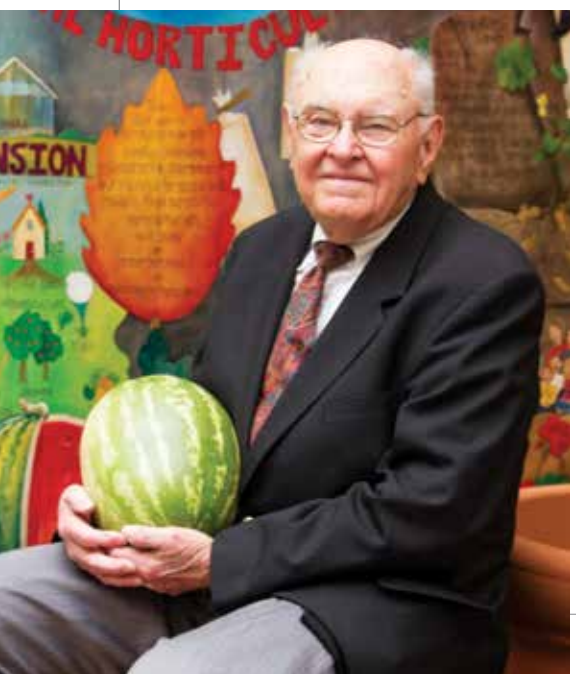
Hall's watermelons, bred for disease resistance and flavor, allowed his varieties to thrive in various soil types and conditions rather than a limited geographic area, which was the norm for variety development at the time.

"We went from a locally-based, seasonal watermelon industry to an international, year-round industry," he says. "I had no idea that someday we'd be able to enjoy watermelon 12 months of the year. It's a revolution compared to the 1950s."

His sweet, seedless varieties remain the leading commercial varieties and serve as parents for many commercial hybrids around the world, both seeded and seedless.

Hall, who served as chair of the Department of Horticulture from 1974 to 1990, also worked with industry partners to begin to name fruit based on qualities rather than geographic area. As a result, the "Crimson Sweet" was born, and melons began to be marketed from produce stands across the country.

*"When I see this stripe I know it came from one of my varieties," says **Charlie Hall**, who developed a sweet, seedless watermelon with disease-resistance that transformed the industry and swept the globe.*



GOOD EATS

ECLECTIC MIX OF IOWA STATE FOOD ENDS WITH DELICIOUS RESULTS

Lauren Grant, a CALS junior in culinary science, accepted a tough challenge—to create a unique recipe based on food developed in the College of Agriculture and Life Sciences. She came up with two tasty dishes using Crimson Sweet or All Sweet watermelon, Maytag Blue Cheese and Chieftain apples (a cross of Jonathan and Red Delicious developed at Iowa State).

CALS Creamy Blue Fruit Dip

- **6-ounces** Neufchatel
- **3 tablespoons** Maytag Blue Cheese
- **1 tablespoon** honey
- **3 tablespoons** brown sugar
- **pinch** of salt and black pepper
- **¼ cup** toasted walnuts, finely chopped
- Crimson Sweet or All Sweet Seedless Watermelon
- Cheiftain apples

Combine Neufchatel and blue cheese in a food processer and process until smooth and completely combined. Add honey, brown sugar, salt and pepper. Process until everything is incorporated. Transfer to a small bowl and stir in chopped walnuts.

Serve with cubed watermelon and sliced Cheiftain apples.

Photo: Bob Elbert

CALS Sweet Blue Melon Salad

Vinaigrette Dressing:

- **¼ cup** white-wine vinegar
- **3 tablespoons** extra virgin olive oil
- **½ teaspoon** garlic powder
- **1 ½ teaspoons** Dijon mustard
- **1 ½ teaspoons** honey

Salad:

- Crimson Sweet or All Sweet Seedless Watermelon, thinly sliced
- Cantaloupe, thinly sliced
- **2 ounces** prosciutto
- **1 - 2 cups** arugula
- **1/2** small red onion, thinly sliced
- **1** Cheiftain apple, thinly sliced
- **¼ cup** Maytag Blue cheese, crumbled
- **¼ cup** fresh parsley, chopped
- **¼ cup** toasted walnuts, chopped

Combine all dressing ingredients and whisk together to fully combine. Set aside. Start assembling the salad by covering a large flat serving dish with sliced watermelon and cantaloupe. Lay sliced prosciutto pieces over fruit followed by the arugula. Top with sliced red onions, apple, blue cheese, parsley and walnuts. Drizzle salad with vinaigrette until lightly dressed; you may not need it all.

***Note:** Proscuitto is a salt cured ham and is often sliced very thinly. It can be found packaged and sold in the refrigerated deli meats area.

***Mike Knipper**, a farmer in Dubuque County, discusses survey questions with Iowa State Extension Specialist **Chad Ingels**. The survey was developed by J. Gordon Arbuckle Jr., and colleagues, to gather data about agricultural practices that could make row-crop agriculture more resilient to the impacts of climate change.*

CHANGING HOW WE UNDERSTAND CHANGE

By Lynn Laws

In the early 1940s the nation was embroiled in a World War and recovering from the Great Depression and a prolonged, devastating drought. Several years before, a new innovation hit the market shown in field trials to increase corn yields by 20 percent or more and to resist drought. It was hybrid corn, developed commercially by Iowa State alum Henry A. Wallace ('10 animal science, MS '20).

Adoption of this new technology, while slow at first, was complete throughout Iowa by 1942, within approximately 13 years of its commercial release. This rapid adoption of an agricultural technology captured the attention of Iowa State Sociology Professor Bryce Ryan and administrators of the Iowa Agricultural Experiment Station.

In 1942, the Experiment Station funded a study by Ryan in order to better understand diffusion of innovation to aid adoption of future farm innovations.

Adoption and Diffusion

For the study, Ryan created a rural survey and charged his research assistant, Neal C. Gross, with the task of interviewing 300 farmers in the Iowa communities of Scranton and Grand Junction regarding their adoption of hybrid corn.

Ryan's interview methodology and his published results became a model for studying and understanding what influences an individual's decision to adopt a new technology and how adoption spreads among a population. The framework that emerged from his study emphasized "knowledge bringers," self-experimentation, opinion leaders and interpersonal communications as influences to adoption and diffusion.

Since Ryan's study, thousands of similar diffusion studies and papers have been published, each reinforcing and building on his seminal theories. Everett Rogers, who participated in rural sociology graduate studies under Iowa State Professor George Beal, is known for popularizing Ryan's theories with his book, "Diffusion of Innovations," which was published in 1962 and continues to influence sociological research.

Factoring in outside factors

Today, J. Gordon Arbuckle Jr. and his colleagues in Iowa State's sociology department research conservation practice adoption, "much of which is rooted strongly in the adoption diffusion tradition," says Arbuckle.

Arbuckle is an associate professor of rural sociology and is the co-director of the Iowa Farm and Rural Life Poll, an annual survey of Iowa farmers, popularly known as "The Farm Poll."

"A difference today is we are trying to expand our research to account for the influence of institutions, such as farm policy, markets, and other actors and forces that may serve as facilitators or barriers to the adoption of a technology.

Another difference is researchers now examine the environmental and social consequences of the adoption of agricultural innovations—there's a concern for long-term consequences and benefits, in addition to the short-term," he says.

"The Farm Poll is a valuable tool for helping stakeholders gain insight into farmer perspectives on agricultural issues," says Arbuckle. "Every year I work with agricultural scientists and agency staff to develop questions for the survey."

In 2013, for example, Arbuckle worked with agronomy and entomology faculty to develop questions about herbicide resistant weeds and Bt-resistant corn rootworm.

"These are pressing problems in the state," Arbuckle says, "The information we gather on farmer knowledge, concerns, and current behaviors can help to guide extension and outreach programming on such issues."

Searching for the missing pieces

Arbuckle recently looked into the adoption of Iowa's Clean Water State Revolving Fund—low interest loans available to help farmers fund conservation practices to reduce runoff. In 2007, state program administrators, concerned the program was underutilized, asked Arbuckle and colleagues to help them find out why.

The study included focus groups with field staff responsible for implementing the loan programs. Findings showed loan recipients were highly satisfied with the loans, but many field staff had not learned enough about the programs to adequately promote them. The research helped state administrators remove adoption barriers for field staff and farmers. As a result, Iowa farmers have obtained millions of dollars for needed conservation efforts.

Arbuckle says his ability to develop adoption-diffusion-related questions for the Farm Poll is enhanced by collaborations with key personnel at the Iowa Departments of Agriculture and Natural Resources, Iowa Soybean Association, Iowa Corn Growers Association, Farm Bureau, Iowa Legislature and mass media.

"My work is always a piece of a larger puzzle," says Arbuckle. "I never have all the answers, but I like to think it helps people who make decisions to make better decisions that serve the needs of agricultural communities." S

Photo: Charles Wittman

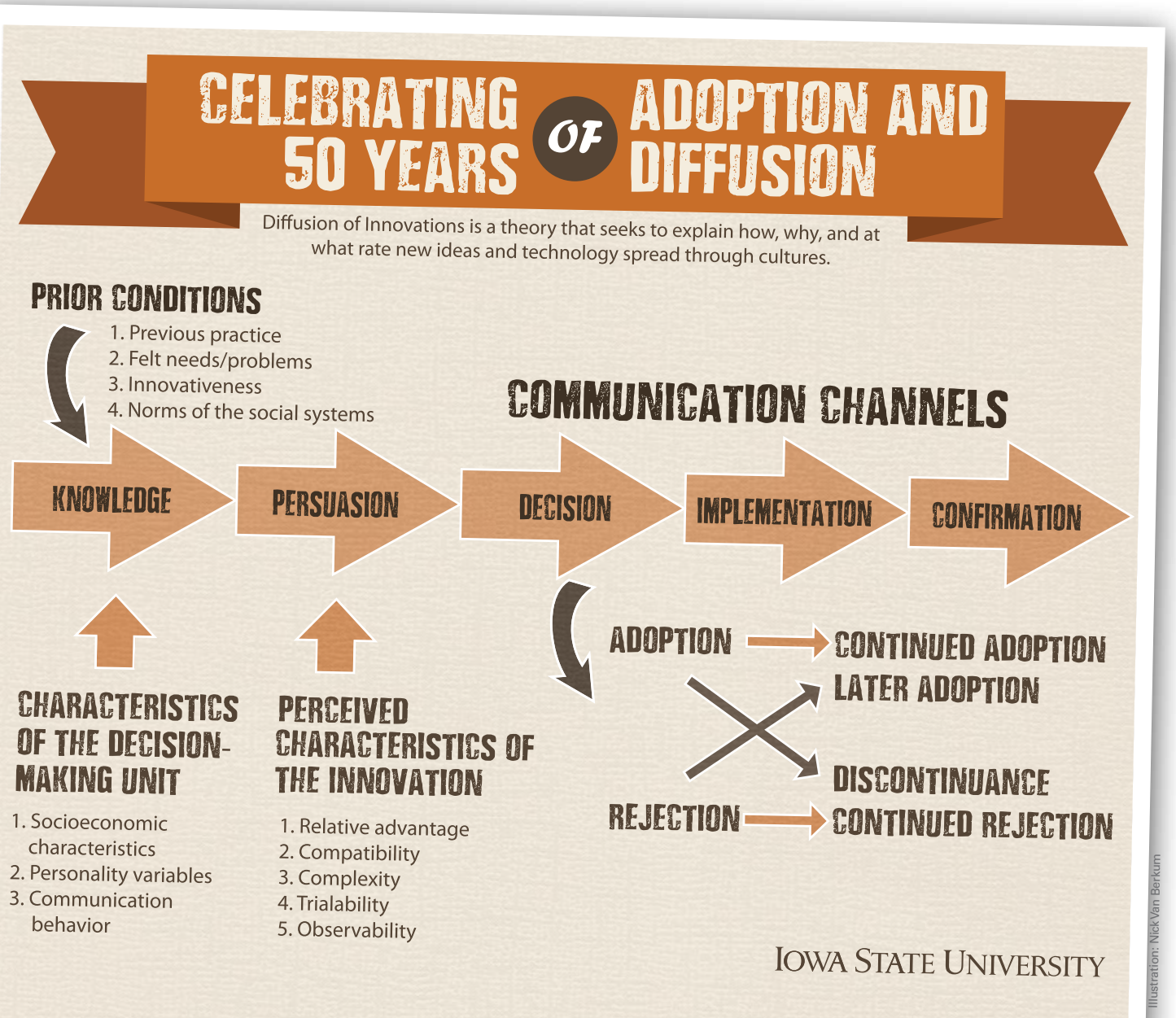


Illustration: Nick Van Berkum

***Chris Tuggle**, left, and **Jack Dekkers** study a line of pigs lacking an adaptive immune system. Their research has significant parallels to human health.*

IMMUNE-DEFICIENT PIGS OFFER INSIGHT TO HUMAN DISEASE

By Ed Adcock

A standard feed efficiency study on pigs at Iowa State University recently led to a startling discovery with implications for human health research. Scientists identified the first pigs with naturally occurring Severe Combined Immunodeficiency, known as SCID. The inherited disorder was known only to naturally affect humans, horses and dogs until this discovery.

Those born with SCID have no adaptive immune system, making them susceptible to infections. David Vetter, who had SCID was known as the "Bubble Boy," in the 1970s for having to live in a sterile room to avoid germs.

Jack Dekkers, an animal science professor leading the SCID pig study, says the discovery came out of a feed efficiency study on pigs, a priority project for the pork industry because of the high cost of feed.

In the late 1990s, lines of pigs were selected for high and low feed efficiency leading to the current 10th generation of the lines. The more efficient pigs require about 12 percent less feed.

To test how the animals would respond to a "disease challenge," pigs from each line were sent to a collaborator on a related project at Kansas State University. There they were to be inoculated with the PRRS virus, the costliest disease in pigs, and evaluated for an immune response.

"Four pigs from the efficient line died fairly early on, and when they did a necropsy they couldn't find any of the major immune organs and they recognized it as SCID, which nobody had ever identified in pigs," Dekkers says.

"Once we realized what it was, it was very exciting because it opened up a lot of opportunities," he says.

Iowa State University researchers conduct many projects investigating human health concerns. Many of them use animals as models to research diseases including AIDS, muscular dystrophy, glaucoma and retinitis pigmentosa.

"Support of the Experiment Station allowed us to develop these lines of pigs, which in their own right are very important to be able to look at the genetics and physiology of feed efficiency," he says. "But also, having access to those populations and studying them in such detail led to unexpected discoveries that could be even more valuable. It's very costly maintaining these lines, but there can also be huge benefits."

Already there has been some interest in the SCID pigs from cancer scientists, he says, and cardiovascular disease researchers are interested because human stem cells won't be rejected since the animals don't have an immune system to reject them.

SCID animals don't have an adaptive immune system, making them a potential model for biomedical research. Transgenic SCID mice are used to grow cancer tumors.

Dekkers says the pig is a much better model than the mouse for many reasons. "One is just size, but also physiologically in terms of the function of the immune system. The pig is much more similar to humans. The results will be much more relevant to humans."

Work with the SCID pigs has included injecting human tumor cells in the SCID pig's ears. The fact that these cells were not rejected proved that the SCID pigs

Photo: Bob Elbert

make a good cancer model for humans.

It's challenging research in many ways. Although antibodies pass to the piglets from the sow as they nurse, the SCID pigs are susceptible to infections after weaning.

Animal scientist Chris Tuggle is working on giving a SCID pig a human immune system.

"If we could put a human immune system into these pigs then we could use the pig to more directly test pathogens that are important for humans and may not affect pigs," he says. "That's still at its very early stages."

The future research opportunities offered by SCID pigs depends a lot on the work being done now. Dekkers said plans are to develop more data and apply for funding from the National Institutes of Health early next year. S

FIGHTING FATAL BRAIN DISEASES IN CHILDREN

When Dr. Matthew Ellinwood began working on the Mucopolysaccharidoses (MPS) and related diseases in 1998 there were very limited therapies for these rare genetic diseases that afflict children.

Now there are drug and enzyme therapies, approved or under evaluation, for five of them. And states are beginning to require neo-natal tests for some of these disorders.

The animal science professor and veterinarian is part of a five-year grant from the National Institutes of Health that includes researchers at Harbor UCLA Medical Center, the University of Minnesota, Duke University and the University of Pennsylvania. The disease being studied is known as MPS I, and is caused by the lack of a key enzyme that breaks down substance the body needs to build nerves, bone, cartilage, tendons, corneas, skin and connective tissue.

The Iowa State role in the project involves using dogs with MPS I as a model to identify improved clinical measures of responses to therapy, which will help advance therapy for children.

"Discovering treatment and measurement of it in the dogs is important to get the enzyme to a point where it can be used to treat the neuro-degenerative disease in kids," Dr. Ellinwood says.

FORECASTING CLIMATE CHANGE, FINDING WAYS TO ADAPT

By Lynn Laws

Twenty-two years ago Gene Takle's first study on climate change in Iowa was published in the Iowa Academy of Sciences. Using a NASA climate model, he explored a future climate scenario where carbon dioxide was doubled.

Referring to the study's predictions, Takle, professor of agronomy and director of Iowa State's Climate Science Program, says, "It showed there would be a general warming, more in the winter than summer; that's happening. More at night than during the day; that's happening. Three percent more precipitation; that's happening—actually it's been a little bit more than that. It also showed there would be a shift toward more precipitation in the spring and early summer and less in the fall and winter. We now have 13 percent more precipitation in the spring and early summer and 22 percent less in fall and winter than 50 years ago."

Since that 1991 study, Takle and his graduate students have researched a multitude of climate-related issues. These include studying the impact of climate change on soil carbon; stream flow in the Mississippi River; United States food security; and the productivity of wind farms, an alternative to carbon-based fossil fuels.

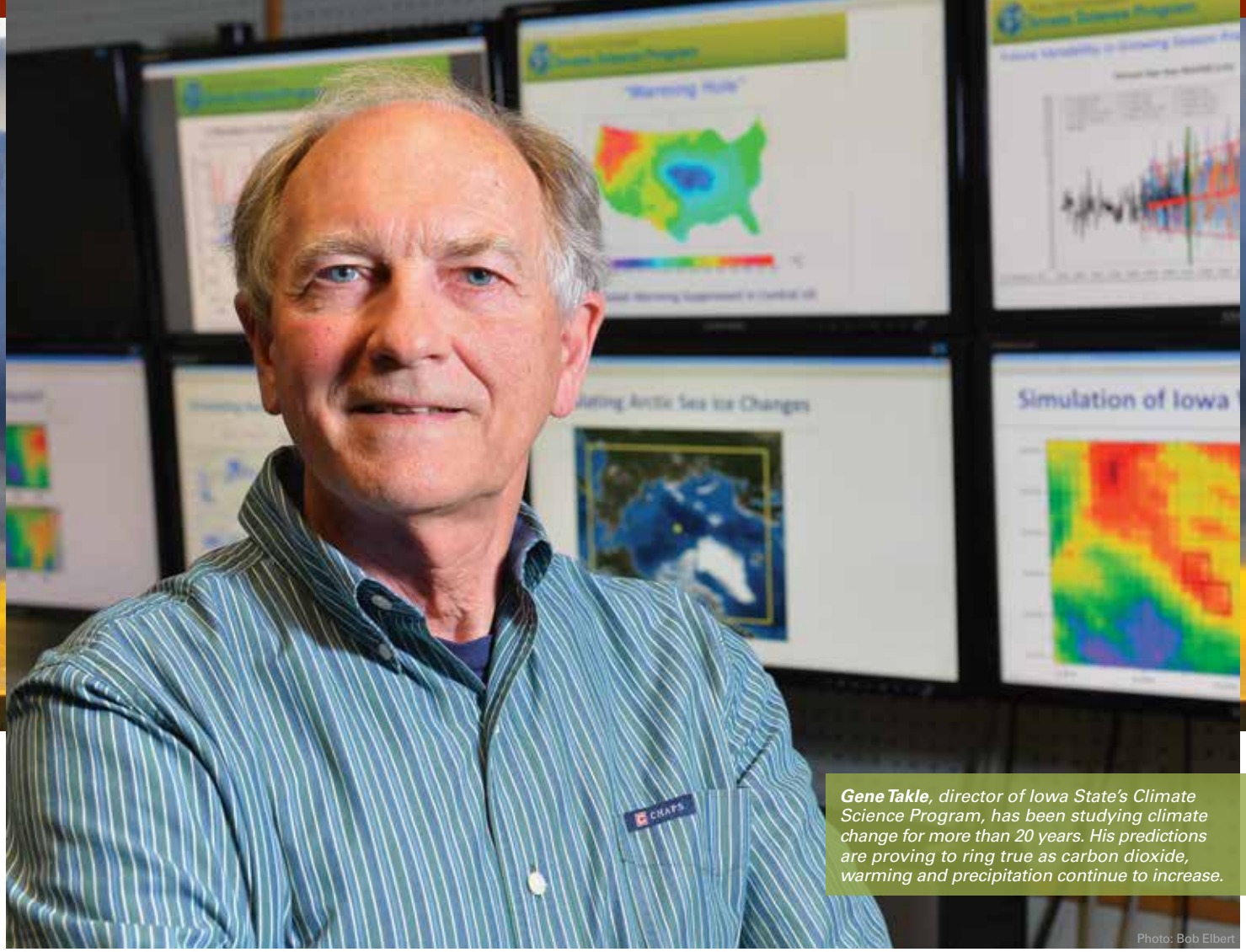
"We're conducting studies of a 200 turbine wind farm, for example," says Takle. "We've measured wind speed in the vicinity of the wakes of the turbines. It's what we would expect. There's about a 30 percent speed reduction in the wind after the air has gone through the turbines. So our question is, if these guys take out a lot of energy, what about neighboring turbines? Will they experience a lower wind power?
Indeed, they do."

Takle says now their studies are connecting the meteorology to the energy produced—what happens when the wind is directly out of the west, for example. Takle has already begun discussions with Iowa State aerospace engineers about utilizing the data being collected from his studies to design best placement of turbines within wind farms.

His multi-disciplined view has produced collaborative projects with people across campus, from architects studying building design, to civil engineers working on roadway construction, and people in agriculture and sociology on a variety of climate change issues. He is excited about using Iowa State's new super computer, called Cyence, which is capable of running "huge climate models" to assess the impact of Iowa's future climate on natural processes and built infrastructure, such as the state's 4,100 bridges.

Takle sees a connection to climate change within every area of study at Iowa State. When he taught his global change course a few years ago, he set out to draw students from an assortment of disciplines. "On the first day I would tell them all, 'You should study climate change, because you will have something important to say about it. There are lots of things we need to understand from an engineering point of view; wind energy is one of them. But even if your major is philosophy or

"Tell me your major and I'll show you a link to climate change."



***Gene Takle**, director of Iowa State's Climate Science Program, has been studying climate change for more than 20 years. His predictions are proving to ring true as carbon dioxide, warming and precipitation continue to increase.*

Photo: Bob Elbert

political science—there are a lot of moral and ethical issues associated with climate change. If we don't get the politics right, we're not going to get the rest of it right. Tell me what your major is and I'll show you a link to climate change.'"

Takle and colleague Jerry Hatfield, director of the National Lab for Agriculture and the Environment, are the convening lead authors of the agricultural chapter of the newest National Climate Assessment, a federally mandated report to be released in 2014.

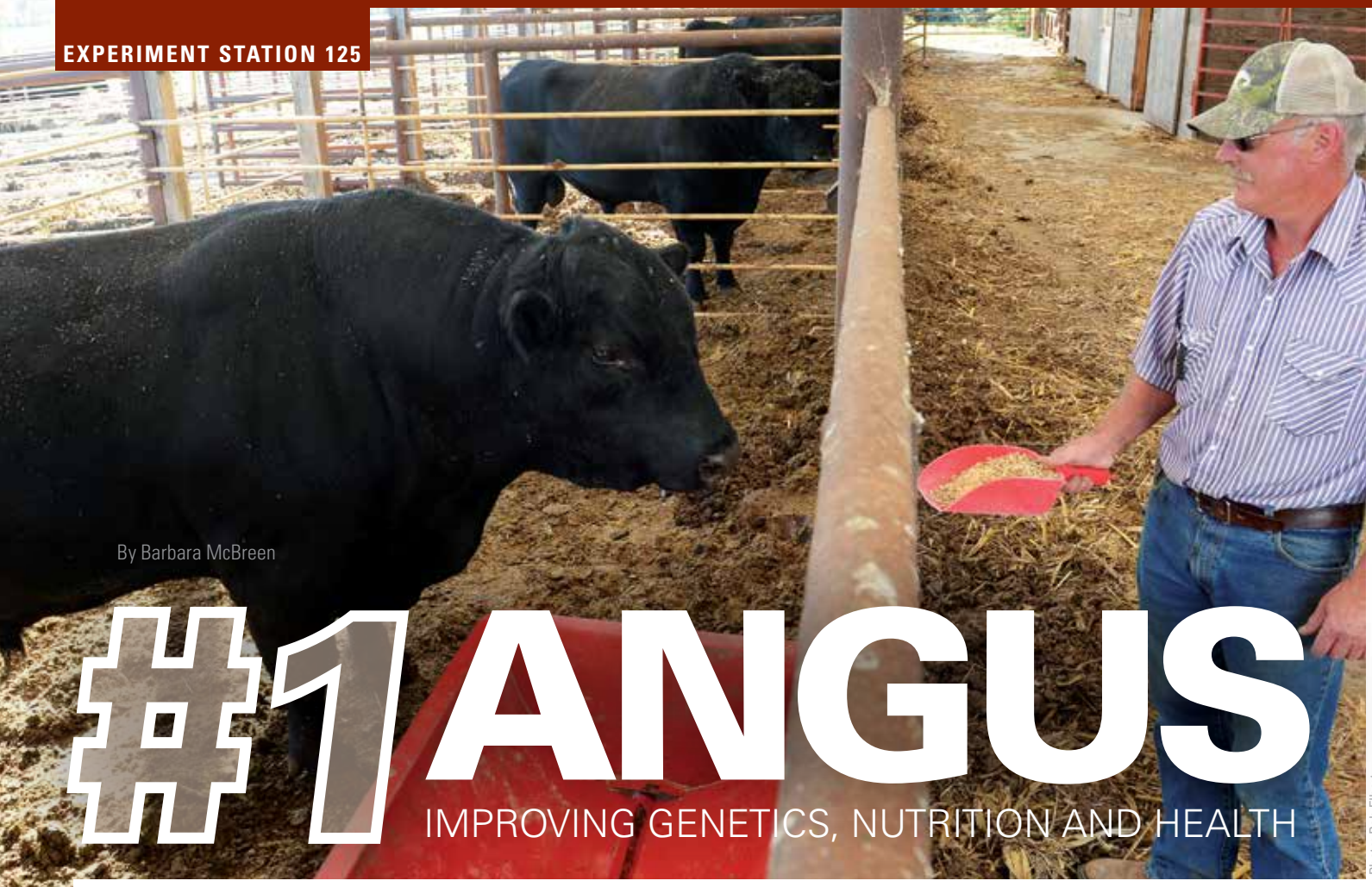
"It will paint a sobering picture of climate change globally and its impacts on the U.S. One of the key messages of the report is that the incidence of weather extremes will continue and will have increasingly negative effects on crop and livestock productivity because critical thresholds are already being exceeded," Takle says. "For example, in western Kansas they are finding they are unable to raise corn even under full, continued irrigation. They cannot pump enough water to keep up with the increasing evapotranspiration demand of the plant, which it uses to cool itself down."

Hatfield says all you have to do is look at crop production in Iowa over the last four years to understand the sensitivity of a cropping system to climate and weather.

"In 2010 we had an extremely wet summer and some of the highest night-time temperatures in late July and in August, which caused reduced yields in both corn and soybeans. In 2011 we had a pretty good growing season; then it turned extremely dry late in the year. Everybody remembers 'The Drought of 2012.' And 2013 started off really wet and turned out extremely dry," Hatfield says. "We can expect to continue to experience extreme weather variability within and among seasons, resulting in increased variability in crop production."

Regarding adaptation to climate change Hatfield says, "If climate changed in an orderly fashion, we could easily adapt and change practices, but we're seeing more and more variation within and among years. Given the extreme variability we're seeing, it will take great effort to figure out how we build resilient cropping systems."

Takle says agricultural experiment stations were established to research and respond to problems such as climate change. "Rather than wringing our hands, we'll work together to find ways to reduce the causes of climate change and develop ways to live with changes we can't avoid. That's what a land-grant university does."S



By Barbara McBreen

#1 ANGUS

IMPROVING GENETICS, NUTRITION AND HEALTH

Photo: Bob Elbert

Producing healthier beef is the goal behind Iowa State University research that produced an Angus bull ranked first in the nation for marbling.

The bull is one of 400 purebred Angus cattle at the Iowa State McNay Memorial Research and Demonstration Farm near Chariton, Iowa. Marbling is a trait found in prime and choice cuts of beef. Marbling produces tastier steaks consumers prefer.

The purpose of the Iowa State Angus herd is to provide research data to improve genetics, disease resistance and nutrition in beef cattle. Although very few animals are sold from the herd as breeding stock, both producers and consumers benefit from the new technology and information the research generates.

"Beef is a wonderful source of nutrients," says James Reecy, professor of animal science and director of the Office of Biotechnology. "Consumers want healthy food and enhancing the nutritional value of beef will increase consumer demand and ensure continued growth of the beef industry."

Iowa State's beef cattle breeding project is led by Reecy and Dorian Garrick, Jay Lush Endowed Chair in Animal Breeding and Genetics. The researchers received a $250,000 Biosciences Initiative grant from the Iowa Legislature in July to collect genomic information on the entire herd.

"This will raise the research and industry profile of the Iowa State University breeding program because it will be the first purebred beef cattle herd in the United States to have the entire herd characterized with whole genome markers in addition to whole genome sequence on the sires and grandsires," Garrick says. "This will be used to demonstrate animal breeding in the genomic era."

The research will relate the animal's genome to their measured performance across a wide range of traits from micro-nutrients to fatty acid composition to growth to carcass traits to disease resistance. Reecy says the project will allow Iowa State to demonstrate to Iowa producers how to implement and utilize genomic selection in beef cattle.

"The Iowa State research herd has been progressively moving toward genomic selection, which provides new opportunities for genetic improvement that will benefit industry, producers and consumers," Reecy says.

The genotyping also will be valuable to collaborators in veterinary science working with animal diseases as well as animal scientists researching grazing behavior, nutrition and meat science.

Sharing knowledge to help Iowans succeed is a long tradition for Iowa's only demonstration cattle farm. The farm introduced cattle producers to ultrasound 17 years ago.

At the time ultrasound technology was an advancement that moved the selection of breeding stock light years ahead of traditional selection methods. The ultrasound technology determined body composition and muscle marbling of live beef cattle. Gene Rouse and Doyle Wilson, both Iowa State emeritus animal science professors,

*Left: **Kevin Maher**, co-manager at the Iowa State McNay Memorial Research and Demonstration Farm, feeds the number-one Angus bull in the United States based on marbling.*

Right: Iowa State Researchers are mapping the genomic data of the Angus herd at the Iowa State McNay Memorial Research and Demonstration Farm near Chariton, Iowa. Once complete, it will be the first purebred beef cattle herd in the United States to have such complete genomic information.

Photo: Bob Elbert

introduced the ultrasound technology pioneered with the McNay herd.

"The Iowa State beef cattle breeding project began with Iowa State animal scientists who used ultrasound as a selection tool," says Mark Honeyman, who coordinates the Iowa State Research and Demonstration Farms. "Ultrasound was a breakthrough in the 1990s because it allowed researchers to measure marbling in live cattle."

Fall calving and early weaning were also management practices pioneered at the farm. Honeyman says the benefits of the demonstration farm go beyond genetics and include research demonstrating grazing, housing, crops and forage updates.

The McNay Farm was established in 1956 as a gift from Harry and Winnie McNay. From 1956 to the 1970s the farm has been the site for beef cattle research, pasture management, tillage, hay storage, sheep production and beef cattle housing management.

The foundation for animal breeding and the Iowa State beef cattle began with Jay Lush. Lush was an Iowa State professor of animal science from 1930 to 1966. He combined management practices, genetics and statistics to formulate a new scientific foundation for livestock improvement. S

IOWA STATE RECOGNIZED WORLDWIDE FOR LIVESTOCK GENETIC DATABASE

As more genetic markers are identified in livestock, the challenge becomes tracking the genetic information. Iowa State University is a world leader in managing a web-accessible centralized data system —The Animal Quantitative Loci Trait (QTL) Database.

"The QTL database currently contains genomic information not only for beef cattle, but also dairy cattle, pigs, chickens, sheep and rainbow trout," says James Reecy, professor of animal science and director of the Office of Biotechnology. "Our expectation is that over time additional species will come on-line."

The database allows researchers around the world to access trait information to enhance and incorporate into their research. Reecy says the impact of the database is far-reaching. "No one would argue this resource is benefiting everyone in the world," he says.

IOWA STATE CONTINUES LEADERSHIP COORDINATING U.S. PIG GENOME PROGRAM

Max Rothschild, C.F. Curtiss Distinguished Professor in Agriculture at Iowa State University, recently concluded 20 years serving as coordinator of the U.S. Pig Genome Coordination Program, supported by the National Research Support Program. In the position he was instrumental in facilitating the international effort that sequenced the swine genome.

In 1993, the research arm of the USDA decided it would support cooperation and collaboration among genome scientists working with livestock and set up a competitive request to select coordinators for swine, cattle, sheep and horses.

The National Research Support Program funded the program, which included support from Iowa State. Every five years Rothschild was reappointed as it was renewed.

The program was renewed in September. Chris Tuggle, Iowa State University animal science professor, and Cathy Ernst, Michigan State University animal science professor, will serve as the new co-coordinators.

NATURE'S PROBLEM SOLVERS

CHAMPIONING CONSERVATION, BOOSTING PRODUCTIVITY

By Lynn Laws

Photo: Chris Witte

***Delise Lockett** received her master's in 2012 researching the use of prairie within an agricultural system. Here she samples the ability of soil to absorb and hold moisture at the Neal Smith National Wildlife Refuge.*

Strips of prairie planted adjacent to crops have proven, in Iowa State studies, to reduce sediment transport to nearby streams by 95 percent and reduce nitrogen and phosphorus transport by 90 percent.

Iowa State faculty have been developing win-win management strategies for natural resource managers and agricultural landowners since offering the first forestry course in 1874.

Paul Errington's work from the 1930s is still having impact today. Errington began his career at Iowa State in 1932 as assistant professor of zoology and director of the nation's first Cooperative Wildlife Research Unit. He was known, along with Aldo Leopold, as one of the great pioneers in animal ecology.

One strategy he encouraged landowners to adopt is still encouraged—the conservation of natural areas for wildlife habitat and income through hunting and trapping or leasing those rights. Errington is best known for his research and writing that transformed the popular view of predators in the wild from noxious to necessary as part of the balance of nature.

Julie Blanchong, associate professor and wildlife disease ecologist, is one of 20-plus faculty members in the Department of Natural Resource Ecology and Management (NREM) currently carrying on the legacy of Errington and others before her.

"I have a variety of research projects across a variety of species, including white-tailed deer, bald eagles and bats, all because they address a practical problem right now," says Blanchong.

Her expertise is in applying genetics to help natural resource managers anticipate, slow and stop the spread of diseases among wildlife in Iowa. "I use genetics to infer connectivity or dispersal rates across the landscape," she says. "For example, how deer move and potentially bring disease into highly agricultural areas versus highly forested landscapes."

White nose syndrome is a disease devastating bat populations in mostly eastern states, but it is spreading west. Iowa has detected the fungus that causes the disease on one bat, but has no evidence of negative effects yet. Bats are natural crop pest control agents that, if eliminated, would increase the pressure to use pesticides. Blanchong is taking advantage of the fact that bats echolocate, using sounds that humans can hear only with special equipment, to establish baseline population information.

"If we don't have a baseline and bad things start to happen and bats start disappearing, we won't know it. And we won't know where to prioritize our surveillance efforts to try to help them out," she says.

Blanchong's NREM colleague John Tyndall has broad interests in natural resource economics, policy and sociology within forestry and agriculture. In addition to studying the viability of using woody biomass for electricity generation, Tyndall is working with a team of scientists on a project that integrates strips of prairie grasses within row crops to reduce the transport of sediment, nitrogen and phosphorus into nearby streams.

"My role as an economist is looking at the pragmatic side: how much does it cost to implement, manage and what are opportunity costs?" says Tyndall. "So far, on the biophysical side, the results are really incredible. For example, we've seen more than 90 percent reduction in sedimentation—the movement of eroded materials off of those basins. From an economic standpoint, the bottom line is this is a relatively inexpensive system to use and comparable to other best management practices."

Another area of interest to wildlife managers and agricultural landowners are impacts on wildlife habitat on farms that reap Iowa's alternative cash crop—wind. As a NREM department graduate student, Molly Gillespie recently completed a study of how certain common Iowa bird species use or avoid wind farms as habitat. The study showed evidence of attraction to the altered habitat by some species, avoidance by others and no real avoidance or attraction behavior in most. Killdeer was one of the species found to be attracted to wind farms. The Killdeer is a sandpiper that needs gravel and sand for nesting.

"They were found nesting on the gravel pads under the turbines and on the access roads," says Stephen Dinsmore, NREM associate professor, who oversaw Gillespie's study. "Access roads and gravel pads that surround the turbine are created in abundance when creating a wind farm. But the access roads, unlike the surrounding county roads, are not heavily traveled. Killdeer sometimes try to nest on gravel county roads, but the results are often devastating to the nests and the birds."

Sue Blodgett, NREM department chair, carries a vision for future contributions to natural resource management concerns and challenges in Iowa.

"Iowa's leadership position as an agricultural state brings with it increased public scrutiny of the impacts of agricultural practices on its natural resources," Blodgett says. "Our research answers the tough questions and provides natural resource management tools for landowners and policy makers. We will tackle future challenges, such as climate change—to assess the impacts and offer new and innovative management practices in response." S

Photo: Sarah Hirsh

ROBOTIC WEEDING LEADS TO BIG LABOR SAVINGS

By Dana Woolley

Lie Tang's research in field robotics offers a glimpse into the future of organic agriculture.

Tang, an associate professor in the Department of Agricultural and Biosystems Engineering, develops robotics technologies for intra-row weed removal in vegetable crops. He hopes that by perfecting this technology, he can design an automated robot to lower the level of labor and chemical inputs in small to mid-sized growing operations for farmers who are looking for environmentally friendly weeding alternatives.

Tang, a native of China, was drawn to Iowa State University in 2004 by the reputation of the agricultural and biosystems engineering department as being on the forefront of agricultural innovation. "This is one of the best places in the world for agricultural robotics and automation," he says.

Robotic response

After talking with Iowa growers of small to mid-size vegetable plots, Tang recognized a hole in current weeding approaches that robotics could fill.

"Weeding has been a long-standing problem for many years because there is no silver bullet—there are just too many variables. And for organic farmers, their options are very limited. Their options are either chemical, laborious or expensive," says Tang. "My robot design offers the producer a more effective and sustainable alternative."

For organic farmer Ken Blackledge, owner of Black Cat Acres in Nevada, Iowa, the battle with weeds occupies much of his time and energy.

"If a robot could weed a diverse crop planting and be cost effective I would be interested. Management of weeds is one of the biggest challenges I face. The costs involved take resources away from crop development, time needed to market and other more productive activities," says Blackledge.

A key part of the small weeding robot is the sensing system used to distinguish produce from weed. Real-time vehicle location in reference to plants, rows and landscape will be monitored and adjusted based on two-dimensional and three-dimensional data.

"There are other, larger weeding robots on the market. But these are designed for much larger growing operations and require high accuracy GPS systems—few farmers in Iowa can buy that type of equipment," says Tang. "The robot will take pictures with three-dimensional sensors to provide more robust information than a conventional camera."

The time of flight of light data will be used to calculate distance, and give a picture


Photo: Bob Elbert

***Lie Tang** (right) talks with **Ken Blackledge** about how his robot will be designed to aid organic farmers. Blackledge owns and operates Black Cat Acres in Nevada, Iowa, with his wife and children.*

of what types of plants are growing in the row. If a weed is found, the small actuators on the robot disturb the soil around the crop and within the row, removing any weeds mechanically without disturbing the crop. The small robot will be designed to travel over planting rows without disturbing the seeded crops, such as carrots, beans, lettuce, sweet corn and many other vegetable crops.

By getting as close as possible to the plants, the robot is able to autonomously remove weeds without the use of herbicides or plastic sheeting while increasing production.

Technology that transforms

Kathleen Delate, professor of horticulture and co-principal investigator, has been enthusiastic about the potential the project holds for organic farmers. She says that not only does the robot offer alternatives to herbicides, it also considers the importance of soil structure.

"Robotic technology for weeding offers promising options for all producers by decreasing labor to manage weeds but also potentially alleviating soil compaction that could occur with tillage. Organic producers especially are interested in this technology because herbicides are disallowed in organic production, and with the increasing problem of herbicide resistance, more and more producers will be looking for alternatives," says Delate.

Tang's research group and collaborators had originally manufactured a larger, slightly more cumbersome robot that served as inspiration for the new, smaller and more aesthetic design.

"In this generation of robot, we are integrating sensing and controls together to fine tune the robot's capabilities," says Brian Steward, professor of agricultural and biosystems engineering and co-principal investigator. "This technology is potentially transforming."

The future is now

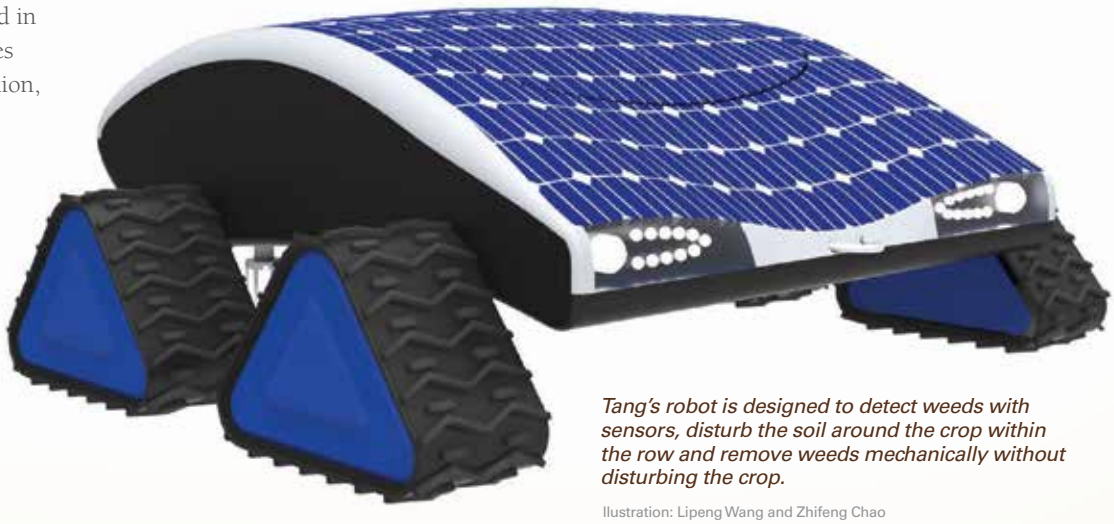
As Steward explains, automation and sensors are developing rapidly. Precision agriculture technologies are quickly being adopted, and thus transforming the farming lifestyle and industry. In order for these technologies to run properly and be maintained, the next generation of agricultural engineer is being trained early to embrace robotics.

"My sons are participating in FIRST robotics competitions," says Steward. "Students are learning to design robots as children. As they move forward in their education, it increases our society's aptitude with robotics. If we are going to adopt robots in agriculture, we need people who can build and repair them. That's happening now."

As the project moves forward, Tang recognizes there will be obstacles, including economic feasibility. However, he's proud of the attention his peers have given his work—this marks one of the first times agricultural field robotics has been included in an organic agriculture related grant.

Pioneering innovative and technologically advanced research has been a staple in the department since it's inception in 1905. It is the birthplace of the first large round baler and whirlwind terrace plow. Over the years, scientists and professors in the department have served as leading investigators of farm mechanics, post harvest grain, farmstead structures and natural resources, proven by their many patents. A feat Tang is eager to replicate.

At this early stage of research and design, it's hard to tell if Tang's robot will find a place among other inventions to come out of the agricultural and biosystems engineering department. But with his team, passion and advancing robotics technology it's not hard to imagine. S



Tang's robot is designed to detect weeds with sensors, disturb the soil around the crop within the row and remove weeds mechanically without disturbing the crop.

Illustration: Lipeng Wang and Zhifeng Chao

ENSURING A **BEAUTIFUL, SAFE ENVIRONMENT** FOR EMPLOYEES

By Melea Reicks Licht

Contributed Photo

***Laynnea Jones**, manager of quality, safety, health and environment works to make safety education fun and effective for L'Oreal employees.*

"BINGO!" Laynnea Jones smiles. One of her students, a distribution employee for L'Oreal, waves his hand to claim his prize. Jones knows that along with his prize he'll take home more knowledge of safety rules and procedures that could save his life or prevent serious injury.

Jones ('04 industrial technology) is a manager of quality, safety, health and environment for L'Oreal—the world's largest cosmetics and beauty company. Bingo is just one method she uses to make safety training fun at the distribution and assembly facility in Cranbury, N.J.

"My job is to engage employees of various backgrounds, educational levels and some for whom English is a second language in learning safety policies and procedures. Safety education can be difficult because of the complexity of regulations. Employees need to learn while having fun, but also take it seriously," she says.

Jones also serves on an audit team for L'Oreal. She reviews the health, safety and quality compliance of the company's distribution and manufacturing centers across the United States.

"We look for compliance to local, federal, state and L'Oreal standards, which are often the most stringent. We look at fire safety codes, eye wash stations compliance, housekeeping, safety validations and training programs in place," she says. "Our visit prepares sites for third party safety audits and certifications and ensures they meet OSHA (Occupational Safety and Health Administration) requirements."

Jones' colleague, Jay Harf, says she maintains an impressive record of success.

"Her efforts resulted in nearly two years without a lost time accident as well as leading the site to the prestigious OHSAS 18001 International Safety Management Certification," says Harf, assistant vice president of environment health and safety.

Setting records has always been a motivator for Jones, who attended Iowa State University on a full track scholarship. Despite being sidelined by injury, the New Jersey native lettered in track and remembers the kindness and "slow pace" of Iowa fondly.

"I never knew tailgating until I came to Iowa State University. And I'll never forget storming the field after winning the Iowa (football) game. That probably wasn't very safe," she jokes.

She found the industrial technology major and emphasis in occupational safety and health in the College of Agriculture and Life Sciences a perfect fit for her outgoing personality, interest in engineering and science and desire for hands-on experience.

Jones serves as secretary of her state chapter of the American Society of Safety Engineers and on a task force to charter student membership. She believes mentorship is key to success and is especially involved in Blacks in Safety Engineering and Women in Safety Engineering.

She is certified by the Board of Certified Safety Professionals as an Associate Safety Professional and is studying to become a Certified Safety Professional—the most prestigious safety certification in the United States.

Jones says, "My motto is safety is not a destination, but a journey of continuous improvement. That can be true for any industry." S

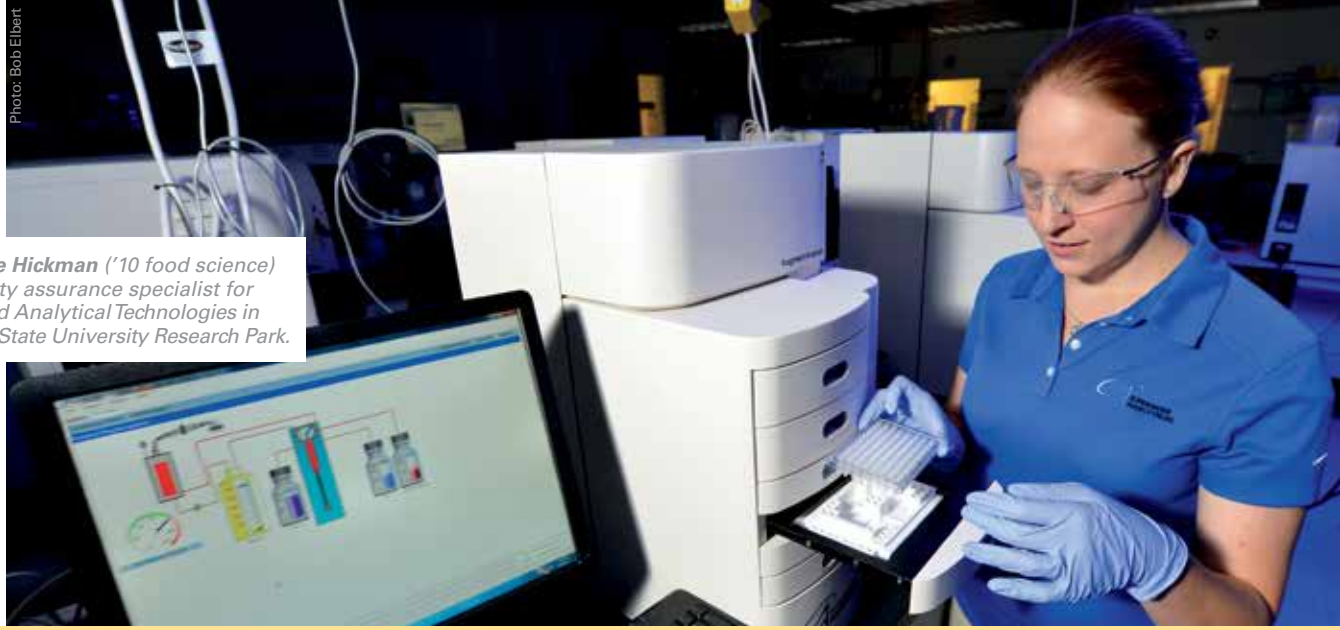


Photo: Bob Elbert

***Katherine Hickman** ('10 food science) is a quality assurance specialist for Advanced Analytical Technologies in the Iowa State University Research Park.*

BATTLING FOR QUALITY IN CUPCAKES AND TECHNOLOGY

By Haley Cook

Whether donning an apron to create delicious confections, or safety glasses to test the inner workings of scientific instruments, Katherine Hickman's goal is the same—to ensure quality excellence.

By day, Katherine (Kleinwort) Hickman ('10 food science) is a quality assurance specialist for Advanced Analytical Technologies in the Iowa State University Research Park. By night, she helps prepare Ames Cupcake Emporium for battle on the national television stage on The Food Network show Cupcake Wars.

Hickman, a native of St. Ansgar, Iowa, began her journey at Iowa State University in 2007 after receiving her pastry and baking degree from Le Cordon Bleu College in Minneapolis, Minn. An avid baker since childhood, Hickman enjoyed the challenge of baking, "It's chemistry at work," she says. "If even one thing is slightly off the entire outcome is affected."

In 2010, Hickman visited the newly opened Ames Cupcake Emporium, met owner Tawnya Zerr and created a lasting friendship and partnership.

According to Zerr, Hickman's aptitude in the kitchen and knowledge of food science made her the obvious choice to help as the assistant baker on Cupcake Wars. "She's great," says Zerr. "She knows her way around a kitchen, and can problem solve."

"Biology, chemistry, food science and quality are all things I learned in college," says Hickman. "Ingredient interaction and quality control were especially helpful with Cupcake Wars."

Those same skills led Hickman to her chosen career in quality assurance.

Advanced Analytical Technologies manufactures and sells an analytical instrument called the fragment analyzer. It is used by researchers in hospitals, museums and agricultural companies around the world to simultaneously measure the size and amount of DNA and RNA in samples. Samples can be used for a variety of research such as analyzing properties of DNA in seed corn.

Hickman describes the process, on a macro scale, as similar to sorting vegetables in a basket—vegetables are separated from one another and the quantity of each is determined.

"Iowa State owns two of our instruments for research in food science and human nutrition and molecular biology," Hickman says. "And our machines are on six of the seven continents."

Hickman has enjoyed reconnecting with one of her favorite food science and human nutrition professors, Lester Wilson.

"I noticed the viscosity of the gel in one of our machines wasn't correct; the DNA wasn't being separated correctly," she says. "We worked together to determine the correct viscosity of the gel, and develop new specifications for the product."

Photo: Candice Smith

CUPCAKE WAR VETERAN

Katherine Hickman teamed up with Tawnya Zerr (left) of Ames Cupcake Emporium for battle on the Food Network show Cupcake Wars for two appearances. Hickman, a quality assurance professional and food science grad, helped launch the team to the final round in their most recent appearance.

At Bessey Hall in the 1970s Esmail Zirakparvar found a mentor and friend in his major professor Don Norton. Zirakparvar says Norton's teaching provided the basis for his entire career.

EXAMPLE OF "TRUE HUMAN DIGNITY" INSPIRES THE RISE OF A GLOBAL LEADER

By Melea Reicks Licht

Esmail Zirakparvar got off the plane in Des Moines from Iran in 1975 as a brutal blizzard gripped the Midwest. With him he had only one suitcase. It did not include a winter coat. Iowa State University drew him across the world to a country where he was unfamiliar with the language, and climate, because it was known as one of the top agricultural universities in the world and for welcoming and embracing those not fluent in English.

Zirakparvar (MS '77 plant pathology, PhD '79) was pleased to discover Iowa State's reputation was true. In Don Norton, professor of plant pathology, he found a mentor and friend. He found a warm welcome.

Zirakparvar says Norton's teaching provided the basis for a career that would come to include steering one of the world's leading companies in crop protection, pest control and biotechnology—Bayer CropScience.

In Norton's nematology lab Zirakparvar also found a partner for his journey. He met his wife, Mary, working alongside him in Norton's lab. Mary earned a plant pathology master's degree in 1980.

Zirakparvar's research is credited for discovering the first known presence of soybean cyst nematode in Iowa. Cyst nematodes are damaging pathogens of plants worldwide. Soybean cyst nematodes cause an estimated loss of $1 billion dollars annually to U.S. soybean producers.

Upon leaving Iowa State Mary worked in nematology at Clemson University and North Carolina State University for several years. Esmail went on to lead and manage businesses for Union Carbide, Rhone-Poulenc Agro, Aventis CropScience and Bayer CropScience in North America, South America, Europe and the Asia Pacific countries.

During his time with Bayer Rhone Poulenc Agro in France, Zirakparvar oversaw technology transfer and management of a new compound now known commercially for one of its uses as Frontline, a flea and tick treatment for pets.

He says he enjoyed moving within the company to see how he could address different challenges. "I realized I could have more impact in management and leadership than in the lab," Zirakparvar says.

As board member and chief operating officer of Bayer CropScience AG in Germany, Zirakparvar played a key role in the merger integration of the agricultural businesses of Aventis and Bayer in 2004.

"Dr. Zirakparvar was instrumental in growing Bayer CropScience to its current leading global position in agriculture," says Thomas Baum, professor and chair of the plant pathology department at Iowa State. "He also ensured Bayer CropScience was a global player dedicated to solving food shortages through safe, improved crops and crop products that offer higher yields, more nutrition and fewer inputs."

Zirakparvar says it was the "no nonsense" attitude he learned at Iowa State that made his success possible.

"The foundation I learned at Iowa State was not to worry about politics and just get the job done. That is a huge, huge factor in successfully managing people. Don Norton not only guided my scientific development, he demonstrated a wonderful way to deal with people," Esmail says. "I am fortunate

Esmail Zirakparvar, retired chief operating officer, president and chief executive officer of Bayer CropScience, says it was the example of the late plant pathology professor Don Norton (at left) that taught him how to lead. Press him to share a few of Norton's lessons and he offers these insights for successfully managing people:

- Be genuine in what you say even if what you say isn't to someone's liking. They will respect you for it.
- Respect people as equal to yourself. We are all human beings.
- You owe it to those you work with to offer straight feedback.
- Never ask people to do things you wouldn't do yourself.
- As a leader you have to ask what can I do for them not what can they do for me.
- Honesty isn't replaceable. Trust can move mountains.
- You can't spend time worrying about failing; you need to spend more time doing your best. Sometimes failure is an important component of the job—then admit when things don't work and move on.
- When not all team members agree on a task, there are two choices—you can be an obstacle, or you can see others' point of view and move forward. If the others are proven wrong you will still be rewarded for your contribution.

to have trained under this legend in the field of nematology and this great example of true human dignity."

Mary adds simply, "Esmail listens to people. If you don't listen how will you ever know how to motivate them?"

Zirakparvar retired as President and COO Chief Executive Officer of Bayer CropScience LP in 2006.

He smiles as he calls his career a "fantastic ride, not possible without the lady who was always next to me and followed me around the world twice."

Since retiring, among other activities, Zirakparvar has stayed connected to agricultural fields. He has been part of Precision BioScience's advisory board and in 2010 he joined American Vanguard Corporation, an agricultural products company, as a member of its Board of Directors.

Eric Wintemute, chairman and chief executive officer of American Vanguard says "Esmail's tremendous international experience allows him to contribute significantly to our analysis of global agribusiness opportunities. His insights into the technological aspects of agriculture and pest control have aided us in strategic and acquisition decision-making."

The Zirakparvars remain connected with Iowa State. They are members of the Order of Knoll President's Circle and Campanile Society and members of the Iowa State Unviersiy Alumni Association.

In 2013, Esmail received the Distinguished Alumni Award, the highest honor given to alumni by the ISU Alumni Association. The award honors individuals nationally or internationally recognized for preeminent contributions to their professions or life's work.

Esmail delivered a presentation at the Don C. Norton Lecture at Iowa State to honor his former professor in 2008. And they funded a research endowment in plant pathology and microbiology to honor Norton. The Zirakparvar Research Endowment in Plant Pathology is intended "to advance the excellence of research within the department to continue its world class reputation."

"Earnings from this endowment could be used to recruit graduate students or for fellowship support to help attract excellent students," Baum says. "That's the challenge we all have—to get the best students. This will be a great tool to do that."

Esmail says it's important to help society advance and have a lasting impact in education.

"The discovery of something better—that's the reason why we established the endowment," he says. "And as a thank you for all Iowa State University has given us."

Photo: Iowa State University Foundation

__Esmail Zirakparvar__ received a 2013 Distinguished Alumni Award presented by ISU Alumni Association president __Jeff Johnson__ (right) and ISU president __Steven Leath__ (left). His leadership is credited for helping Bayer CropScience become a global leader.

ALUMNI HONORED BY CALS, ISU ALUMNI ASSOCIATION

The following awards are conferred at the ISUAA Honors and Awards Ceremony at Homecoming each fall. The 2013 Honors and Awards Ceremony, Nov. 8, marked the 82nd year of the event.

Outstanding Young Alumni Award by the ISU Alumni Association

- **Matthew Leu** ('99 animal science, MBA '07), Pewaukee, Wis.
- **Catherine Swoboda**, ('08 agronomy, MS '10 crop production and physiology), Des Moines, Iowa

Floyd Andre Award by the College of Agriculture and Life Sciences

- **David Morrison** ('69 food technology, '71 MS chemical engineering), Paradise Valley, Ariz.

Henry A. Wallace Award by the College of Agriculture and Life Sciences

- **Jim Blome** ('85 agronomy and pest management), Raleigh, N.C.

George Washington Carver Distinguished Service Award by the College of Agriculture and Life Sciences

- **Jon E. Kinzenbaw**, Williamsburg, Iowa

Superior Achievement Award for Early or Mid-Career Alumni by the College of Agriculture and Life Sciences

- **Sarah A. Low** ('02 public service and administration in agriculture), Arlington, Va.

LAUVER NAMED FUTURE GIANT OF SEED INDUSTRY

Andrew Lauver ('12 agricultural studies), a Frank Ross International Business Intern at DuPont Pioneer, was presented with Seed World Magazine's 2013 Future Giant of the Seed Industry award at the American Seed Trade Association's (ASTA) annual convention in June. Lauver was also nominated to serve on ASTA's Seed Foundation Board.

ARNOLD HONORED FOR INTERNATIONAL WORK IN SOILS

Dick Arnold ('52 farm operations, PhD '63 agronomy) received the 2013 Lomonosov Gold Medal from the Russian Academy of Sciences in recognition of more than 30 years of domestic and international work teaching about soil formation, erosion and conservation. Arnold worked for the U.S. Soil Conservation Service and through the U.S. Agency for International Development he worked with underdeveloped countries to expand the knowledge of soils.

IN MEMORIAM

Garren Benson ('71 PhD agronomy), died May 25. Benson served as an ISU Extension agronomist, specializing in corn and soybean production from 1964 until his retirement in 1996. He remained on the faculty in the agronomy department until 1999.

Roger Mitchell ('54 agronomy, '61 PhD crop physiology) died June 4 after a prolonged illness with leukemia. Mitchell was director of the farm operations curriculum at ISU in the 1960s and led agriculture travel courses in the United States and Europe. He served as chair of agronomy at the University of Missouri, dean of University of Missouri Extension and vice president for agriculture at Kansas State University. From 1983 until his retirement in 1998, Mitchell served as dean of the College of Agriculture, Food and Natural Resources at the University of Missouri.

Kenneth Frey, distinguished professor emeritus in agronomy, died July 14. Frey served on the faculty for 40 years and was recognized both nationally and internationally as a plant breeder. In 2007, ISU established the Kenneth Frey Endowed Chair in Agronomy, currently held by Thomas Lubberstedt.

Rich Robson ('64 animal science, '66 MS biochemistry, '69 PhD) died on Aug. 4. Robson served for more than 30 years as a professor in the departments of animal science and Roy J. Carver biochemistry, biophysics and molecular biology.

Thomas Wickersham ('41 animal science, '54 MS) died Aug. 12. Wickersham was an emeritus professor of animal science at Iowa State University where he began teaching in 1950. He also served as an ISU Extension agent and sheep field specialist for many years.

Dick Thompson ('53 animal science, '57 MS) died on Aug. 17. Thompson was a co-founder of Practical Farmers of Iowa. He was honored by the Leopold Center for Sustainable Agriculture with the 2004 Spencer Award for Sustainable Agriculture.

TARTÉ HONORED BY AMERICAN MEAT SCIENCE ASSOCIATION

The American Meat Science Association (AMSA) announced that **Rodrigo Tarté** is the recipient of the 2013 AMSA Meat Processing Award. The award, established in 1977, is sponsored by Smithfield Foods. Tarté ('87 food technology, '90 MS, '96 PhD food science and human nutrition and animal science) was honored at a special reception and awards banquet at the AMSA 66th Reciprocal Meat Conference in June.

CENTER FOR CROPS UTILIZATION RESEARCH ADDS VALUE THROUGH INNOVATION

Photo: Bob Elbert

***Chia-Wei Chang**, executive vice president of The Lauridsen Group, Inc. has grown the food and health ingredient company Proliant from its early days of incubation with the Center for Crops Utilization Research.*

By Virginia Zantow

Enter the Lauridsen Group's research laboratory in Ankeny, Iowa, and you'll find researchers developing new ways to make the raw ingredients of Iowa agriculture into ingredients for food and health products.

Space for benchtop and pilot plant research is essential for a food and health ingredient company like theirs. Before this laboratory was constructed in 2012, one place the group's researchers conducted pilot plant experiments was at Iowa State.

The Center for Crops Utilization Research (CCUR) industry incubator in the food sciences building provided space and technology for benchtop and pilot plant research to Proliant. The company has been part of the Lauridsen Group, Inc. (LGI) holding group since the mid-1990s.

"We used the incubator because it helped us in the beginning when we were small," says Chia-Wei Chang (MS '81 meat science), the executive vice president of LGI, formerly the president and CEO of Proliant Meat Ingredients. "The CCUR industry incubator is important to small Iowa companies."

The process Proliant researchers developed at CCUR involved recovering Bovine Serum Albumin, a protein from bovine blood in purified form so it could become a specialized material used in diagnostic, life science research, biopharmaceutical and veterinary vaccine industries. This process was perfected at CCUR, and Proliant built a plant in Boone, Iowa, to commercialize their production of the material.

Proliant now employs 40 people at the plant in Boone, and the company plans to build an identical plant in New Zealand. Proliant and LGI have grown exponentially since their CCUR days. The global reach of LGI now includes 49 plants and facilities in the United States, Europe, Asia and Latin America. When Proliant first started working with CCUR, the company owned two plants.

Lawrence Johnson, director of CCUR, says it is rewarding to watch small businesses develop new processes and products, commercialize and grow as companies.

"I don't like just developing technology and putting it on the shelf," Johnson says. "I like to see new products come out and go down a processing line."

Johnson says what LGI does—create ingredients, as opposed to complete products—is something Iowa entrepreneurs have a unique opportunity to do.

The proximity of raw agricultural materials gives Iowans in the food industry opportunities to break apart those raw materials when they are fresh.

Chang agrees being in an agricultural state is good for his business.

"Fresh raw materials always equal higher quality products," Chang says.

If fresh materials are a great starting point for an agriculture-based company, adding value to those materials by innovation is what grows a company.

"The reason companies can continue to grow is that they can add value to a product," Chang says. "That's why this new lab is important to our future growth."

Proliant hires talented Iowa State alumni frequently to discover new ways to add value to their products.

Chang says companies like LGI need people with many different kinds of skills.

He says it's important to know that scientists are not necessarily limited to working in a lab. His scientific background helped him sell Proliant's products, but he has learned business skills along the way.

"What is most important is the learning mind," Chang says.

POWER OF EDUCATION

By Fred Love

CROSSING CONTINENTS,

Rebecca Wokibula *was introduced to Iowa State through a partnership with Makerere University in Uganda where she studied land management and soil science. The service-learning program supported by the Center for Sustainable Rural Livelihoods helped inspire her to pursue her master's at Iowa State.*

Contributed Photos

IMPROVING LIVES

Rebecca Wokibula, clad in cap and gown, was ready for her master's graduation ceremony. She was one student among swarms of others posing in front of the Campanile, the Memorial Union and Lake LaVerne, their proud parents snapping pictures—except for one difference. For Wokibula, a native of Uganda, Graduation Day was only the second time she had set foot on the Iowa State campus.

Wokibula's is a story of resilience, determination and family. But most of all, it's a story of one woman's journey to achieve her dreams and, in the process, bring life-altering innovations to small farmers in her home country.

Wokibula completed her degree through Iowa State's Master of Science in Agronomy distance education program, which grants students wide latitude to finish coursework online at their own pace without having to sacrifice professional and family commitments.

Wokibula, the first student from beyond North America to complete the program, didn't take the traditional route to her degree.

"It's a dream come true," Wokibula said during an interview in Agronomy Hall just hours before her graduation ceremony in May. "It's something worth celebrating, and I'm very proud."

An interest in agriculture

Orphaned as a young girl, Wokibula was raised by her siblings who were only a few years older. She later enrolled at Makerere University in Uganda where she studied land management and soil science.

Makerere University partners with the College of Agriculture and Life Sciences, with support from its Center for Sustainable Rural Livelihoods on a service learning program that aims to bring together undergraduates from both schools to improve lives in Uganda. Wokibula was among the first students to participate in the service learning program, and it served as her introduction to Iowa State University. She didn't know it at the time, but her connection to Iowa State was just beginning.

A touch of grace, a new family

Chuck and Margo Wood, of St. George, Utah, met Wokibula in 2006 while the Woods accompanied a Center for Sustainable Rural Livelihoods delegation to Africa. The Woods were seated next to Wokibula during a banquet—a chance encounter that would change all their lives.

"She was such a personable and loving person," Margo Wood recalls. "She was so kind to us, and there was an immediate connection."

Chuck Wood, who grew up in Spencer and graduated from Iowa State in 1963 with a degree in animal science, agreed.

"She impressed us immediately—her intelligence, her grace. We knew we would have to stay in contact with her," he says.

After their initial meeting, Chuck and Margo kept tabs on Wokibula via email and over the phone. They even visited her in Uganda on a few occasions. When Wokibula told the Woods in 2007 that she was considering getting a master's degree from Iowa State, she got their full support.

"We made her a deal," Chuck says. "We would underwrite a major portion of the cost if she promised to use the education she received to help small farmers in Uganda."

And that's just what happened. She entered the Master of Science in Agronomy program in 2008. Chuck and Margo covered half the cost of Wokibula's education, while the Center for Sustainable Rural Livelihoods paid for much of the rest. Wokibula also earned the Virgil K. Webster Scholarship, a $1,000 award that covered two courses in fall 2008.

Blending life and academics

During the five years it took her to complete the program, Wokibula got married, gave birth to her daughter Emily and took on a full-time job working with

***Chuck** and **Margo Wood**, supporters of the Center for Sustainable Rural Livelihoods, connected with Becky Wokibula and provided her the support, both familial and financial, to complete her Master of Science in Agronomy via distance education at Iowa State. She's now working to improve agricultural infrastructure, land management practices and market access in eastern Africa.*

Ugandan farmers to improve their operations. One of the program's greatest advantages is that it's designed to move at the speed of the student, says Ken Moore, an Iowa State University Distinguished Professor of Agronomy and director of the master's program.

The 40-credit program can be completed in two years, but most students take only a class or two per semester and finish their degree in three to five years, Moore says. Wokibula distinguished herself as a driven student, he says.

"There were times she was the only student who showed up for online discussion, and it was something like four o'clock in the morning in Uganda," Moore says. "That speaks volumes about her character and her dedication to learning."

Most of the coursework for the master's program is carried out online, and only an orientation and a creative component seminar require students to travel to Ames. The seminar requirement brought Wokibula to campus for the first time in 2011. At the same time, she took on an internship with the center for Sustainable Rural Livelihoods during which she visited Iowa farms and took part in World Food Prize events in Des Moines.

Mark Westgate, director of the Center for Sustainable Rural Livelihoods and Wokibula's major professor, applauded her dedication to Ugandan agriculture.

"She has a really nice blend of practical approaches to real farm issues and a need to help farmers in Uganda improve," Westgate says. "She's working every day to improve the situation on the farm, and she's committed her life to doing so."

Wokibula credits the faculty at Iowa State for working around the complications that would pop up because she was so far away. That meant dealing with the occasionally unreliable communications technology available in Uganda.

"I'd never taken a class online before, but the faculty and staff walked me through it and made sure I was up to speed," she says. "I'm so grateful for the understanding that they showed me and the help they gave me."

Research that makes a difference

To complete her master's degree, Wokibula honored the agreement she made with Chuck and Margo Wood to use her education to help farmers in her home country. Her research focused on studying how a legume called lablab interacts with corn to increase yields. By growing lablab in the same field and meeting certain conditions that she tested, Wokibula found that soil fertility improves and corn yields can jump as much as 40 percent—a quantum leap that could greatly improve incomes and quality of life for Ugandan farmers.

"It's my hope that farmers in Uganda will utilize what I've learned and put my research to use," she says.

Wokibula works with Kyklou, a nonprofit group striving to enhance living conditions in eastern Africa by improving agricultural infrastructure, land management practices and market access. She hopes to convince farmers to adopt the practices illuminated by her research.

Graduation Day

On May 10, 2013, five years after beginning the master's program and nearly two years since she last set foot in Ames, Wokibula put on her cap and gown and received her degree during a ceremony on campus.

And once again, it was Chuck and Margo who made the trip possible. They paid for Wokibula—along with her husband Paul and young daughter—to travel to campus so she could attend the commencement ceremony.

"It has brought us great joy, pleasure and fulfillment to see Becky grow and achieve her goals," Chuck says. "We developed a personal relationship with her and consider her a member of our family."

And the feeling is mutual. As Wokibula went through the pomp of graduation day, Emily, her two-year-old daughter, zipped between Chuck and Margo with ease before zipping back to her mother or Paul. They took a few minutes to pose together for photographs in the Agronomy Hall courtyard, enacting the same graduation day ritual that was playing out among scores of other families across campus. S

IN OUR NEXT ISSUE

STORIES
IN AGRICULTURE AND LIFE SCIENCES

STORIES ACROSS IOWA

The next **STORIES** in Agriculture and Life Sciences from Iowa State University will focus on projects and programs making a **DIFFERENCE** across Iowa, and the people making them happen. Released in **HARMONY** with the Iowa State University Alumni Association's special **VISIONS** Across America issue this spring, the next **STORIES** will highlight a few of the many **GREAT** things happening in our home state. For updates about our Iowa **STORIES** follow the College of Agriculture and Life Sciences on Twitter (@iastate_cals) and Facebook.

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When Jacob Hunter came to Iowa State to learn about agriculture, he was surprised how much he learned about himself. He learned he has a knack for inspiring a passion for agriculture in others. He learned he was a born teacher. Whether in Uganda or at the Iowa school where he now teaches, Jacob's Iowa State adventure has helped him inspire agriculturalists at home and around the world.

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